

Toward a Definition of HIV Expertise: A Survey of Experienced HIV Physicians

BARBARA GERBERT, Ph.D.,¹ JAMES C. MOE, Ph.D.,¹ MICHAEL S. SAAG, M.D.,^{2,3}
CONSTANCE A. BENSON, M.D.,^{3,4} DONNA M. JACOBSEN, B.S.,³
ANDREW FERAIOS, M.Ed.,¹ MISAKO E. HILL, B.S.,³ AMY BRONSTONE, Ph.D.,¹
NONA CASPERS, M.F.A.,¹ and PAUL A. VOLBERDING, M.D.^{3,5}

ABSTRACT

Medical care for human immunodeficiency virus (HIV)-infected persons has grown increasingly complex, yet few studies have examined experienced HIV physicians' views about current HIV medical care. The objective of this study was to examine the relationship between physicians' HIV experience, self-perceived expertise, and confidence with providing 18 aspects of HIV medical care and between confidence in aspects of care and medical specialty. At geographically diverse, HIV continuing medical education programs conducted in the fall of 1999, 359 currently practicing HIV physicians completed a written survey measuring participants' demographic characteristics, experience, HIV expertise, and level of confidence providing essential aspects of HIV care. Participants currently managed a median of 50 HIV-infected patients with a career total of 300. Significant correlations were found between experience and expertise items and experience and 15 of 18 confidence items. Confidence levels varied from 11% to 85% highly confident across 18 aspects of HIV care. Physicians' confidence with providing aspects of HIV care varied by the three predominant specialty groups (infectious diseases, internal medicine, and family practice/general medicine). Physicians who have informally specialized in HIV care reported a range of self-perceived expertise and confidence, indicating the complexity of HIV medical care today. Our results suggest that even the most experienced HIV physicians in the United States continue to benefit from more experience and that each medical specialty examined in this study brings its own set of skills needed to provide optimal HIV care. This study constitutes a first step toward defining and formalizing HIV medical care.

INTRODUCTION

MEDICAL CARE for human immunodeficiency virus (HIV)-infected persons has grown increasingly complex. During the first

decade of the acquired immune deficiency syndrome (AIDS) epidemic, when antiretroviral treatments were not available, physicians focused on palliative approaches, devoting their energies to caring for the sick and dying. Physi-

¹Division of Behavioral Sciences, University of California San Francisco, San Francisco, California.

²Department of Medicine, The University of Alabama at Birmingham, Birmingham, Alabama.

³International AIDS Society—USA, San Francisco, California.

⁴Division of Infectious Diseases, University of Colorado Health Sciences Center, Denver, Colorado.

⁵Department of Medicine, University of California San Francisco, San Francisco, California.

cians providing HIV care are now responsible for managing a complex, multisystem, chronic disease and must continually integrate rapidly emerging, clinically relevant research findings into their practice. Physicians must prescribe and adjust appropriate combination therapy regimens; monitor and treat medication side effects; and interpret new technologies, such as plasma HIV RNA assays and drug resistance testing, to help monitor disease progression and determine choice of drug regimen.¹⁻⁶ While keeping up with the pharmaceutical and technological advances, physicians must monitor patient adherence, translate scientific terminology, and continue to care for their patients in terms of the ongoing social and psychological ramifications associated with what remains a debilitating and stigmatizing disease. Physicians caring for HIV-infected individuals need to have the specific skills of a specialist and maintain the general skills required for good primary care.

Historically, physicians from a variety of medical specialties and subspecialties (e.g., infectious diseases, internal medicine, family practice, dermatology, oncology, obstetrics and gynecology, allergy and immunology) have chosen to provide care for people with HIV disease. No one specialty has dominated the field. In the late 1980s and early 1990s, the incidence of AIDS was projected to rapidly increase and treatment options were limited. This resulted in AIDS being viewed as a primary care disease, with the goal of mainstreaming HIV-infected patients into existing care systems.⁷⁻⁹ The introduction of more potent and effective antiretroviral therapies and the resulting declines in AIDS-related morbidity and mortality¹⁰ has made HIV care more complex, engendering new debates about the skills, training, and knowledge necessary to provide adequate HIV care.¹¹⁻¹⁵ Who is best qualified to provide HIV-infected patients with appropriate medical care? Should there be any minimum criteria defining who can provide HIV care? Should HIV medicine become a formal subspecialty, or should it fall within the domain of an existing subspecialty? To help answer these questions, the skills, qualities, and expertise of those physicians highly experienced in providing HIV medical care must be further defined.

As a first step toward defining and formalizing HIV clinical care, we set out to examine the views of highly experienced HIV physicians about providing HIV-infected patients with quality medical care. Physicians attending state-of-the-art continuing HIV medical education programs in four urban areas with high incidences of HIV infection and AIDS were surveyed about their experience, training, and confidence with providing the range of services required to treat HIV-infected patients. Specifically, we examined the relationship between experience (number of HIV-infected patients treated), expertise (physicians' perceptions of their own HIV expert status), and self-reported confidence with providing essential aspects of HIV medical care. We also examined the relationship between confidence in aspects of care and medical specialty. These data contribute to the debate about the formalization of HIV medical care and provide valuable information about the role of HIV experience and expertise on the provision of quality HIV medical care in the era of potent antiretroviral therapies.

METHODS

Participants

Five hundred fourteen surveys were distributed to physicians attending International AIDS Society—USA (IAS—USA) continuing medical education programs in New York, Chicago, San Francisco, and Los Angeles. IAS—USA is a national, not-for-profit organization providing continuing HIV medical education for physicians who are actively involved in HIV/AIDS care. Only those surveys returned by currently practicing physicians who were beyond the level of residency training were included in the analyses.

Participant recruitment

Anonymous surveys were distributed to all physicians attending the four IAS—USA continuing medical education programs on HIV care offered in the fall of 1999. Participants were given the survey at course registration and were instructed to complete the surveys prior to the start of the course. Completed surveys were returned to program staff. The study

procedures were approved by the University of California San Francisco Committee on Human Research.

Instrument

The survey assessed participants' demographic and practice characteristics (17 items), self-perceived HIV expertise (2 items), and level of confidence with providing HIV care (18 items). Seventeen demographic and practice characteristics were assessed, including medical specialty, how long participants had been caring for HIV-infected patients, the number of HIV-infected patients treated during their careers and currently being treated, and the percent of their practice comprising HIV-infected patients. Participants also were asked (1) if they consider themselves to be an HIV expert (rating themselves as "yes," "unsure," or "no"); (2) the extent of their HIV expertise (1 = "limited experience with HIV" to 7 = "HIV expert"); and (3) how confident they were in providing various aspects of HIV care (1 = "not at all confident" to 7 = "extremely confident"). Eighteen items for which confidence was assessed were developed by a panel of HIV experts asked to identify skills relevant to providing quality HIV care. These items reflect skill areas that HIV experts commonly encounter in their day-to-day interactions with HIV-infected patients. For some of these areas (e.g., the interpretation of CD4⁺ cell counts), there is a considerable knowledge base. Other areas (e.g., managing numerous antiretroviral regimen failures) have only recently emerged as clinical management situations and therefore the knowledge base is just beginning to be defined.

Data analysis

Confidence with providing various types of HIV medical care was assessed using seven-point Likert scales. To describe confidence levels and to examine differences in confidence among participants in each specialty group, three-level variables were created from the original seven-point scale variables: participants who answered 6 or 7 were scored as having "high confidence"; those who answered 4 or 5 were scored as having "medium confidence"; and those who answered 1, 2, or 3 were

scored as having "low confidence." Data were stored and analyzed by using the SAS System statistical package.¹⁶ Kruskal-Wallis tests were used to determine whether physicians with different specialties differed in their confidence in providing aspects of HIV care. When the Kruskal-Wallis test was significant, Wilcoxon rank sum tests were conducted to determine which specialty groups differed significantly from the others.

Participants were asked to report the total number of HIV-infected patients they had treated in their careers. Responses to this question were divided into quartiles to create a four-level experience variable: 1 = 0–100 patients; 2 = 101–300 patients; 3 = 301–500 patients; 4 = 501 or more patients. We then calculated Spearman rank correlations between this four-level experience variable and participants' responses to the seven-point Likert scale confidence items, as well as the two items assessing self-reported HIV expertise.

RESULTS

Sample characteristics

Of the 514 surveys that were distributed, 359 were completed by eligible physicians, yielding a response rate of 78% (359/459). Fifty-five were returned by ineligible participants (i.e., currently in residency training or not currently in practice).

Demographics of the sample are presented in Table 1 and the sample's HIV practice characteristics are presented in Table 2. The majority of the sample were white (69%), male (61%) physicians practicing in urban health care settings with predominantly HIV-focused or HIV-only practices (61%). Seventy-three percent of the sample had been caring for HIV/AIDS patients for 6 or more years, having practiced prior to and after the introduction of potent antiretroviral regimens. The sample represents physicians highly experienced in providing HIV care, with a median of 50 HIV-infected patients currently being managed in their practice and a median of 300 managed throughout their careers.

Three specialties predominated: infectious diseases (ID), internal medicine (IM), and fam-

TABLE 1. DEMOGRAPHICS OF SAMPLE

Characteristic	All physicians n = 359	ID physicians n = 109	IM Physicians n = 123	FP/GM physicians n = 85
Age (mean)	44 yrs	45 yrs	43 yrs	42 yrs
Gender				
Male	61%	61%	65%	56%
Race				
White	69%	70%	63%	75%
Asian/Pacific Islander	15%	17%	15%	12%
African American/Black	9%	7%	13%	6%
Latino/Hispanic	5%	4%	6%	5%
Other	2%	3%	2%	2%
Location of primary practice setting				
Urban	77%	78%	78%	72%
Suburban	19%	19%	20%	21%
Rural	3%	3%	1%	7%
Primary setting of current work				
Community health center	19%	4%	23%	37%
Hospital based practice	18%	19%	18%	10%
Group private practice	15%	17%	16%	14%
HIV/AIDS clinic	13%	19%	12%	10%
Solo private practice	9%	11%	9%	5%
University full-time position	9%	16%	3%	6%
Staff or group model HMO	4%	4%	4%	4%
Veterans Affairs hospital	2%	4%	2%	0%
Laboratory research	1%	1%	0%	1%
Other	11%	6%	12%	13%

ID, infectious diseases; IM, internal medicine; FP/GM, family practice/general medicine.

ily practice or general medicine (FP/GM). The ID physicians reported the most experience in providing HIV care in terms of years of experience, percent of HIV-infected patients in their patient panels, and numbers of patients treated (Table 2).

Do HIV physicians perceive themselves as experts?

On the three-point scale of expertise (yes, unsure, no), the majority (55%) of participants indicated "yes," they are HIV experts; the re-

TABLE 2. CHARACTERISTICS OF HIV PRACTICE

Characteristic	All physicians n = 359	ID physicians n = 109	IM Physicians n = 123	FP/GM physicians n = 85
Length of time caring for people with HIV				
Less than 1 year	1%	1%	1%	4%
1 to 2 years	6%	3%	4%	11%
3 to 5 years	19%	20%	22%	15%
6 to 10 years	33%	24%	40%	37%
More than 10 years	40%	51%	32%	34%
Current practice HIV focus				
HIV only	13%	18%	11%	9%
HIV-focused	48%	57%	44%	45%
Minor HIV	39%	25%	45%	46%
Median percent of practice comprised of HIV/AIDS patients	25%	50%	19%	12%
Median number of HIV/AIDS patients				
Currently managing	50	74	54	45
Career total	300	500	250	162

ID, infectious diseases; IM, internal medicine; FP/GM, family practice/general medicine.

TABLE 3. RELATIONSHIP BETWEEN NUMBER OF HIV PATIENTS TREATED AND PHYSICIANS' SELF-PERCEIVED EXPERTISE AND CONFIDENCE

Item	Spearman correlation	95% Confidence interval
Extent of self-reported HIV expertise	0.61*	0.54–0.68
Consider self an HIV expert	0.53*	0.44–0.62
Confidence with managing opportunistic infections	0.51*	0.42–0.60
Confidence with diagnosing opportunistic infections	0.50*	0.41–0.59
Confidence with managing antiretroviral drug adverse effects	0.43*	0.34–0.53
Confidence with diagnosing malignancies	0.40*	0.29–0.50
Confidence with interpreting HIV genotype test results	0.37*	0.27–0.47
Confidence with choosing the initial antiretroviral regimen for a treatment-naïve patient	0.36*	0.25–0.46
Confidence with remaining up-to-date with advances in HIV/AIDS care	0.35*	0.24–0.45
Confidence with interpreting plasma HIV RNA levels	0.33*	0.22–0.44
Confidence with assessing when to begin therapy with a treatment-naïve patient	0.31*	0.20–0.41
Confidence with prescribing antiretrovirals for a patient in whom numerous multiple antiretroviral regimens have failed	0.31*	0.20–0.41
Confidence with interpreting CD4 ⁺ cell counts	0.29*	0.18–0.39
Confidence with interpreting HIV phenotype test results	0.28*	0.17–0.38
Confidence with managing malignancies	0.25*	0.14–0.36
Confidence with assessing patient adherence to drug regimens	0.15*	0.04–0.26
Confidence with assessing patients' sexual risk behaviors	0.14*	0.03–0.25
Confidence with assessing patient substance use/abuse	0.06	–0.05–0.18
Confidence with promoting patient health through general prevention messages (such as smoking cessation, nutrition)	0.04	–0.08–0.15
Confidence with managing the general medical care unrelated to HIV/AIDS (such as asthma, diabetes) of your HIV/AIDS patients	–0.09	–0.20–0.02

* $p < 0.0001$.

maintaining were unsure (17%) or denied expertise (28%). Seventy-three percent of the ID physicians considered themselves to be HIV experts compared with 50% of the IM physicians and 40% of the FP/GM physicians. On the seven-point scale assessing extent of self-perceived expertise with HIV care, 51% of participants rated themselves as having high expertise with HIV care (answering 6 or 7 on the seven-point scale). Sixty-three percent of the ID physicians, 47% of the IM physicians, and 41% of the FP/GM physicians rated themselves as having high expertise with HIV care.

How are self-perceived expertise and confidence related to experience?

Table 3 shows the correlations between self-perceived expertise and experience and the correlations between confidence with providing specific aspects of HIV care and experience. For these correlations, experience was based on the number of HIV-infected patients treated in their careers. Self-perceived expertise and con-

fidence increased with HIV experience as evidenced by the significant correlations on 17 of the 20 items. Self-perceived expertise along with physicians' confidence with diagnosing and managing opportunistic infections and managing antiretroviral drug adverse effects were most highly correlated with HIV experience. The lowest correlations with levels of significance were observed between HIV experience and confidence in assessing adherence to drug regimens, and HIV experience and confidence with assessing sexual risk behaviors. HIV experience was not significantly correlated with confidence in assessing patient substance use/abuse, promoting patient health through general prevention messages, and managing the general medical care unrelated to HIV/AIDS of HIV-infected patients.

In what skills are HIV physicians most confident?

Table 4 summarizes the self-reported confidence levels of participants with providing var-

TABLE 4. SELF-REPORTED CONFIDENCE WITH PROVIDING HIV MEDICAL CARE

Item	Confidence level	All	ID	IM	FP/GM	Significant differences
		physicians n = 359 ^a % (N)	physicians n = 109 ^a % (N)	physicians n = 123 ^a % (N)	physicians n = 85 ^a % (N)	
Interpreting CD4 ⁺ cell counts	High	85 (298)	91 (99)	84 (103)	79 (67)	
	Medium	14 (48)	8 (9)	15 (18)	18 (15)	
	Low	1 (5)	1 (1)	1 (1)	4 (3)	
Interpreting plasma HIV RNA levels	High	80 (281)	83 (91)	84 (102)	74 (62)	
	Medium	17 (60)	15 (16)	13 (16)	23 (19)	
	Low	3 (9)	2 (2)	3 (4)	4 (3)	
Choosing the initial antiretroviral regimen for a treatment-naïve patient	High	75 (264)	78 (85)	80 (98)	65 (55)	c,d
	Medium	21 (73)	19 (21)	17 (21)	27 (23)	
	Low	4 (14)	3 (3)	3 (4)	8 (7)	
Assessing when to begin therapy with a treatment-naïve patient	High	75 (262)	75 (82)	83 (102)	64 (54)	c,d
	Medium	21 (74)	23 (25)	14 (17)	26 (22)	
	Low	4 (15)	2 (2)	3 (4)	11 (9)	
Promoting patient health through general prevention messages (such as smoking cessation, nutrition)	High	75 (262)	59 (64)	84 (102)	83 (70)	
	Medium	22 (78)	37 (40)	16 (20)	13 (11)	
	Low	3 (10)	5 (5)	0 (0)	4 (3)	
Managing the general medical care unrelated to HIV/AIDS (such as asthma, diabetes) of your HIV/AIDS patients	High	72 (251)	50 (54)	89 (108)	82 (70)	b,c
	Medium	23 (82)	39 (43)	10 (12)	15 (13)	
	Low	5 (17)	11 (12)	1 (1)	2 (2)	
Diagnosing opportunistic infections	High	70 (247)	87 (95)	71 (87)	51 (43)	b,c,d
	Medium	25 (89)	13 (14)	27 (33)	38 (32)	
	Low	4 (15)	0 (0)	2 (2)	12 (10)	
Managing opportunistic infections behaviors	High	63 (222)	89 (97)	61 (75)	38 (32)	
	Medium	30 (104)	11 (12)	32 (39)	47 (40)	
	Low	7 (25)	0 (0)	7 (8)	15 (13)	
Assessing patient's sexual risk	High	59 (207)	46 (50)	68 (83)	60 (51)	b
	Medium	36 (125)	48 (52)	30 (36)	33 (28)	
	Low	5 (19)	6 (7)	2 (3)	7 (6)	
Remaining up-to-date with advances in HIV/AIDS care	High	50 (176)	48 (52)	55 (67)	42 (35)	
	Medium	43 (151)	48 (52)	38 (46)	49 (41)	
	Low	7 (23)	4 (4)	7 (9)	10 (8)	
Assessing patient substance use/abuse	High	47 (165)	28 (30)	60 (73)	53 (45)	b,c
	Medium	43 (149)	55 (59)	36 (44)	39 (33)	
	Low	10 (36)	18 (19)	4 (5)	8 (7)	
Diagnosing malignancies	High	43 (152)	55 (60)	45 (55)	27 (23)	c,d
	Medium	45 (159)	39 (43)	48 (59)	51 (43)	
	Low	11 (40)	6 (6)	7 (8)	22 (19)	
Managing antiretroviral drug adverse effects	High	42 (145)	43 (47)	43 (53)	36 (30)	
	Medium	49 (171)	50 (55)	48 (58)	49 (41)	
	Low	9 (33)	6 (7)	9 (11)	15 (13)	
Assessing patient adherence to drug regimens	High	41 (145)	36 (39)	47 (58)	46 (39)	
	Medium	49 (171)	51 (56)	48 (59)	42 (36)	
	Low	10 (35)	13 (14)	5 (6)	12 (10)	
Prescribing antiretrovirals for a patient in whom numerous multiple antiretroviral regimens have failed	High	23 (80)	22 (24)	26 (32)	21 (18)	
	Medium	44 (154)	43 (47)	45 (55)	39 (33)	
	Low	33 (117)	35 (38)	29 (35)	40 (34)	
Interpreting HIV genotype test results	High	18 (62)	25 (27)	16 (19)	13 (11)	b,c
	Medium	45 (158)	48 (52)	43 (53)	44 (37)	
	Low	38 (131)	28 (30)	41 (50)	44 (37)	
Interpreting HIV phenotype test results	High	12 (42)	17 (18)	9 (11)	10 (8)	b,c
	Medium	39 (137)	50 (55)	40 (48)	25 (21)	
	Low	49 (169)	33 (36)	51 (61)	65 (55)	
Managing malignancies	High	11 (37)	7 (8)	10 (12)	9 (8)	
	Medium	38 (133)	37 (40)	46 (56)	31 (26)	
	Low	52 (181)	56 (61)	44 (54)	60 (51)	

^aN varies from row to row due to missing data.

^bID significantly different from IM.

^cID significantly different from FP/GM.

^dIM significantly different from FP/GM.

p values vary from less than 0.05 to less than 0.0001; see text. ID, infectious diseases; IM, internal medicine; FP/GM, family practice/general medicine.

ious aspects of HIV care. Overall, participants were most confident (answered 6 or 7 on the seven-point confidence scale) in their ability to interpret CD4⁺ T-cell counts (85%), interpret plasma HIV RNA levels (80%), choose the initial antiretroviral regimen for treatment-naïve patients (75%), assess when to begin therapy for treatment-naïve patients (75%), promote patient health through general prevention messages (75%), and manage the general medical care of their HIV/AIDS patients (72%). Participants were least confident in their ability to prescribe antiretroviral therapy for patients in whom numerous antiretroviral regimens have failed (23%), interpret HIV genotype results (18%) and phenotype results (12%), and manage malignancies (11%).

How does confidence with aspects of HIV care vary by specialty?

Confidence levels differed by physician specialty (Table 4). Only high confidence percentages (6 or 7 on confidence scale) are reported in the text. The FP/GM physicians were significantly more confident than the ID physicians in their abilities to promote patient health through general prevention messages (83% vs. 59%, $p < 0.001$), manage the general medical care of their HIV/AIDS patients (82% vs. 50%, $p < 0.001$) and assess patient substance use/abuse (53% vs. 28%, $p < 0.001$).

The IM physicians were significantly more confident than the ID physicians in their abilities to promote patient health through general prevention messages (84% vs. 59%, $p < 0.001$), manage the general medical care of their HIV/AIDS patients (89% vs. 50%, $p < 0.001$), assess patient substance use/abuse (60% vs. 28%, $p < 0.001$), and assess patients' sexual risk behaviors (68% vs. 46%, $p < 0.01$).

The IM physicians were significantly more confident than the FP/GM physicians in assessing when to begin antiretroviral therapy (83% vs. 64%, $p < 0.01$), choosing the initial antiretroviral regimen for treatment-naïve patients (80% vs. 65%), $p < 0.05$, and diagnosing malignancies (45% vs. 27%, $p < 0.001$).

The ID physicians reported significantly greater confidence than the IM physicians in interpreting HIV genotype test results (25% vs.

16%, $p < 0.05$), interpreting HIV phenotype test results (17% vs. 9%, $p < 0.01$), diagnosing opportunistic infections (87% vs. 71%, $p < 0.01$), and managing opportunistic infections (89% vs. 61%, $p < 0.001$). The ID physicians also reported significantly greater confidence than the FP/GM physicians in interpreting HIV genotype test results (25% vs. 13%, $p < 0.01$), interpreting HIV phenotype test results (17% vs. 10%, $p < 0.001$), diagnosing opportunistic infections (87% vs. 51%, $p < 0.001$), managing opportunistic infections (89% vs. 38%, $p < 0.001$), assessing when to begin antiretroviral therapy (75% vs. 64%, $p < 0.05$), choosing the initial antiretroviral regimen for treatment-naïve patients (78% vs. 65%, $p < 0.05$), and diagnosing malignancies (55% vs. 27%, $p < 0.001$).

DISCUSSION

The introduction of potent antiretroviral therapy regimens and the ability to monitor risk for disease progression with CD4⁺ T cell counts and HIV RNA assays has dramatically changed HIV medicine. The decision to begin antiretroviral therapy holds lifelong implications for patients, requires patient commitment to treatment and readiness to adhere, and affects all future treatment decisions. If physicians are not confident with their skills in these areas, they may not be able to best help their patients consider options and make wise decisions based on current and valid information. The data from the highly experienced physicians in this study contribute to the debate about who is best prepared to provide optimal HIV medical care and further inform us about the role of experience in HIV care. Our results suggest that even the most experienced HIV physicians in the United States continue to benefit from more experience and that each medical specialty examined in this study—infected diseases, internal medicine, and family practice/general medicine—brings its own set of skills needed to provide optimal HIV care.

The physicians in this study were far more experienced than physicians in prior studies demonstrating a positive relationship between physicians' HIV experience and their prescribing patterns and patient outcomes.¹⁷⁻¹⁹ The

majority of physicians in our sample (61%) are providing care within the context of HIV-only or HIV-focused practices to high volumes of HIV-infected patients in urban settings, where the bulk of HIV-infected patients reside in the United States. Regardless of the area of medical specialty in which they were trained, most of these physicians have chosen to practice HIV medicine, and have informally become what might be termed HIV specialists. The median number of HIV-infected patients that the physicians in our sample currently treated was 50, and many had cared for 500 or more patients throughout their careers. Previous estimates that approximately 1% of physicians care for 80% of HIV-infected patients in the United States²⁰ support the observation that informal specialization has occurred.

Prior studies have demonstrated that experienced providers have better patient outcomes¹⁷ and are more likely to follow contemporary, state-of-the-art medical guidelines.^{18,19} We do not know, however, how much experience is enough. Even this sample of highly experienced, dedicated HIV physicians reported a range of confidence and self-perceived expertise. Levels of confidence and self-perceived expertise were still related to experience, even when the upper limits of experience were in the thousands of patients treated. At what point a physician's sense of her/his own expertise is no longer enhanced by treating more HIV-infected patients is not answered by our study. This finding, however, can be viewed as an indicator of the complexity and uncertainty of providing HIV medical care and the demands this rapidly changing field places on physicians. Clearly, it is unrealistic to expect physicians who see one or few HIV-infected patients to provide confident, competent care. Physicians practicing in areas with low incidence of HIV, who may not be able to gain this type of experience, should consult with experts.

Physician confidence levels varied by HIV medical care skills and reflect the reality of HIV medical care today. The majority of physicians was highly confident with interpreting well-established laboratory procedures (e.g., CD4⁺ T-cell counts and plasma HIV RNA levels) and with making relatively low risk, high benefit treatment decisions that are based on docu-

mented evidence (e.g., choosing the initial regimen for a treatment naïve patient). Most physicians were also highly confident with their general medical skills and their ability to promote health through general prevention messages. As would be expected, physicians lacked confidence in decision-making areas associated with high risk or high uncertainty. Specifically, they lacked confidence in areas in which (1) published research has yet to provide clear guidance (e.g., prescribing antiretrovirals for a patient in whom numerous antiretroviral regimens have failed); (2) the expertise was outside of their own and traditionally followed by specialists (e.g., managing malignancies in HIV-infected patients); and (3) the research was not yet disseminated and/or the technology was not universally available (e.g., interpreting HIV genotype and phenotype results). These results support the face validity of our instrument. In this era of evidence-based medicine, they also indicate that continuing medical education efforts in HIV medicine must continue to educate HIV physicians on making decisions when traditional evidence is lacking. Physicians who provide HIV care must pay special attention to evaluating both the source and validity of emergent information.

Patients with HIV disease need physicians who are confident with their abilities to develop management plans and utilize the latest available technologies. With the rapid pace of change in HIV medicine, this requires constant updating and the ability to stay abreast with technological changes. In our study, the ID and IM physicians were more confident than the FP/GM physicians regarding assessing when to begin therapy, choosing the initial antiretroviral regimen, and diagnosing malignancies. Notably, these three areas are correlated with number of patients treated; perhaps the FP/GM group would have similar levels of confidence if they had treated as many HIV-infected patients as the ID and IM physicians. The ID physicians were more confident than the other groups of physicians with diagnosing and managing opportunistic infections and interpreting genotype and phenotype results. These differences likely reflect their specialty training and their higher level of experience with providing care for HIV-infected patients

both in terms of numbers of patients treated and number of years treating. The ID physicians in our sample had been following patients for a longer period of time than our other two groups. They also had treated more HIV-infected patients prior to the introduction of potent antiretroviral regimens and thus were more likely to have seen and treated the range of opportunistic infections.

In addition to skills with new technologies and antiretroviral management, HIV physicians need to be confident with their primary care skills and able to provide excellent general medical care. HIV infection has become a chronic disease and patients with HIV and AIDS need comprehensive medical care, including care that addresses the psychosocial aspects of the disease. Physicians need to be confident with their ability to address substance abuse, assessing abuse and relapse, and intervening when appropriate. In our study, the FP/GM and IM physicians were more confident than the ID physicians regarding general medical care skills, promoting patient health through general prevention messages, and assessing patient substance abuse. These findings suggest that the most competent HIV physician would be highly experienced, with both specialist and generalist skills.

Although this study provides initial information about the type and breadth of experience necessary for developing HIV expertise for physicians, most physicians provide care within the context of a team and increasingly care is being provided by a variety of health care professionals. The team approach, with nurse practitioners, physicians assistants, pharmacists, nurses, social workers, mental health professionals, and others, is becoming the ideal for quality HIV care. Future research should examine how the team approach enhances HIV care and patient outcomes.

This study has several limitations. First, the results from this convenience sample cannot necessarily be generalized to all physicians providing HIV care. To our knowledge, however, this is the only study of a geographically diverse convenience sample of physicians who have informally specialized in HIV medical care, thus providing valuable information about the skills, qualities, and expertise needed

in this area. Second, our results are limited by the nature of self-report data. Third, our study does not examine how confidence is related to HIV-care processes and outcomes. Future research should explore these relationships.

The results of this study have informed us about the role of experience and specialist and generalist skills in the provision of quality HIV medical care. One thing is clear—dedicated HIV physicians, self-made specialists, are needed to help better define and formalize this complex, ever-changing area of medicine.

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Address reprint requests to:

Barbara Gerbert, Ph.D.

Division of Behavioral Sciences

University of California San Francisco

350 Parnassus Avenue, Suite 905

San Francisco, CA 94117

E-mail: gerbert@itsa.ucsf.edu