

# Adherence Counseling Practices of Generalist and Specialist Physicians Caring for People Living with HIV/AIDS in North Carolina

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**CONTEXT:** National guidelines recommend that practitioners assess and reinforce patient adherence when prescribing antiretroviral (ART) medications, but the extent to which physicians do this routinely is unknown.

**OBJECTIVE:** To assess the adherence counseling practices of physicians caring for patients with HIV/AIDS in North Carolina and to determine characteristics associated with providing routine adherence counseling.

**DESIGN:** A statewide self-administered survey.

**SETTING AND PARTICIPANTS:** All physicians in North Carolina who prescribed a protease inhibitor (PI) during 1999. Among the 589 surveys sent, 369 were returned for a response rate of 63%. The 190 respondents who reported prescribing a PI in the last year comprised the study sample.

**MAIN OUTCOME MEASURES:** Physicians reported how often they carried out each of 16 adherence counseling behaviors as well as demographics, practice characteristics, and attitudes.

**RESULTS:** On average, physicians reported spending 13 minutes counseling patients when starting a new 3-drug ART regimen. The vast majority performed basic but not more extensive adherence counseling; half reported carrying out 7 or fewer of 16 adherence counseling behaviors "most" or "all of the time." Physicians who reported conducting more adherence counseling were more likely to be infectious disease specialists, care for more HIV-positive patients, have more time allocated for an HIV visit, and to perceive that they had enough time, reimbursement, skill, and office space to counsel. After also controlling for the amount of reimbursement and availability of space for counseling, physicians who were significantly more likely to perform a greater number of adherence counseling practices were those who 1) cared for a greater number of HIV/AIDS patients; 2) had more time allocated for an HIV physical; 3) felt more adequately skilled; and 4) had more positive attitudes toward ART.

**CONCLUSIONS:** This first investigation of adherence counseling practices in HIV/AIDS suggests that physicians caring for patients with HIV/AIDS need more training and time allocated to provide antiretroviral adherence counseling services.

**KEY WORDS:** adherence; antiretroviral; HIV/AIDS; medication compliance; physicians.

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National treatment guidelines for HIV/AIDS recommend that medical practitioners routinely assess, reinforce, and support patient adherence to complex antiretroviral regimens (ART) because it is critical to successful treatment.<sup>1-3</sup> Physician-patient communication about medication can influence patients' adherence.<sup>4-14</sup> However, physicians may regard recently recommended activities,<sup>1</sup> such as helping patients develop strategies to overcome multiple psychosocial barriers to adherence,<sup>15-26</sup> to be outside of a physician's usual role.<sup>15,16</sup> Some physicians may feel unable to effectively address adherence due to lack of time, reimbursement, or training.

Understanding antiretroviral counseling practices of physicians could guide the development of comprehensive ART adherence interventions, but information about such practices is currently limited. No studies have assessed physicians' adherence-related practices specific to HIV/AIDS treatment. Previous studies have shown that physicians with more experience treating patients with HIV/AIDS provide better care;<sup>27-31</sup> however, these studies did not assess the provision of adherence counseling.

In the study presented here, we assessed the usual care antiretroviral adherence counseling practices among all identifiable physicians in the state of North Carolina caring for patients living with HIV/AIDS, and compared infectious disease specialists' and generalists' practices. In addition, we sought to identify physicians' demographic, practice, and attitudinal characteristics associated with carrying out a greater number of adherence counseling activities.

## METHODS

### Overview

By mail, we surveyed all physicians in North Carolina whom we identified as caring for patients with HIV/AIDS. We used a prescription-tracking database maintained by a commercial vendor to identify all physicians in North Carolina reported to have prescribed a protease inhibitor (PI) in the last year.<sup>32</sup> The vendor is a health care information company that obtains prescribing information from pharmacies that provide data based on prescription transactions.<sup>32</sup> We used the criteria of "having prescribed a PI" because this was standard treatment for HIV at the time of the study. We sent a prenotification letter to identified physicians' preferred American Medical Association mailing

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address, followed, a few days later, by a 6-page survey and \$5 cash incentive. Among those not responding initially, we sent 2 additional full mailings and 1 reminder postcard from February through May 2000 (including a chance to win a \$250 prize in the last mailing). The university's institutional review board approved all study procedures.

## Sample

We sent the mailing to all of the 609 North Carolina physicians whose name appeared on at least 1 prescription transaction for a PI in 1999. Three of the physicians had died and 17 surveys were returned due to bad addresses. Among the remaining 589 surveys, 369 were returned for a usable response rate of 63%.

Respondents who reported on the survey that they had written at least 1 prescription for a PI in the last year and that they currently cared for at least 1 HIV-positive patient were considered eligible. Among the 357 respondents who answered these items, 190 of these met eligibility criteria and comprised the study sample. Based on conversations with the vendor, we speculate that reasons for the discrepancy between the number of names listed in the prescription-tracking database and the number reporting that they had prescribed a PI include: 1) some physicians who had signed a prescription did not consider themselves to be the prescribing physician (e.g., a surgeon writing post-operative orders on an HIV-positive patient); or 2) some physicians' names were entered erroneously when the prescription was dispensed, probably because of illegible signatures.

Self-reported demographic and practice characteristics of eligible respondents were compared with those of ineligible. As expected, ineligible respondents were more likely to be from a specialty other than internal medicine, family practice, or infectious diseases and from a non-academic practice. In fact, only 1% of ineligible responders were infectious disease specialists compared with 25% of those eligible ( $P < .0001$ ).

## Outcomes and Outcome Measures

**Adherence Counseling Behaviors.** Adapting items from the Adherence and Efficacy of Protease Inhibitor Therapy Study (ADEPT) provider adherence behavior scale,<sup>19</sup> the United States Pharmacopeial (USP) Medication Counseling Behavior Guidelines,<sup>33</sup> and OBRA-90 (Omnibus Budget) guidelines, a 16-item 5-point scale (ranging from "never" to "all of the time") was developed by the investigators (CEG, SRS, SR) to represent counseling behaviors that physicians used "when prescribing a new antiretroviral regimen" (Table 2). Likewise, we also developed an 8-item 5-point scale representing 8 adherence counseling behaviors that physicians performed "on follow-up visits after starting antiretrovirals." Physicians were asked, for each of these behaviors, "Thinking of your typical practice when prescribing antiretrovirals, please indicate how often you do each of the following activities." Final revisions were

made based on pilot testing of items for face validity, content, and wording among 15 social scientists, clinicians, and clinician researchers.

The number of behaviors conducted "most" or "all of the time" were summed to create an overall discrete scale of the number of adherence counseling behaviors conducted "when prescribing a new antiretroviral regimen."

We also asked physicians, "On average, how much time, if any, do you spend counseling a patient about his or her medication 1) when initiating a typical new 3-drug combination of antiretrovirals?"; and 2) "during a follow-up visit after starting a typical 3-drug regimen of antiretrovirals?" We chose to ask about a 3-drug regimen because it was the *sine qua non* of HIV therapy at the time of the survey (although this is no longer the case).<sup>1</sup> To assess the construct validity of the behavior scales, we examined the correlation between the number of adherence counseling behaviors reported performed, and the number of minutes respondents reported they spent counseling; we found them to be moderately correlated ( $r = .37, P < .0001$ ).

## Potential Predictors of Adherence Counseling and Covariates

**Demographics, Practice Characteristic, Health System, and Attitudinal Factors.** Respondents reported demographic and practice characteristics.<sup>34-36</sup> Zip codes of respondents' primary practices were linked to the county-based Area Resource File to identify rural practices.<sup>34,35</sup> We assessed the time, space, training, and reimbursement available to physicians for adherence counseling, adapting questions from the Physician Worklife Study<sup>36</sup> (see Appendix). To assess time-related factors, we asked respondents to "Please estimate the average time (in minutes) allocated to you, actually spent, and the amount of time you feel would be needed to provide high quality care for your HIV/AIDS patients for: 1) a complete physical/consultation visit; and 2) a routine follow-up visit."<sup>36</sup> In addition, physicians' attitudes,<sup>37</sup> beliefs, and knowledge about adherence counseling, antiretroviral medications, and HIV-positive patients were assessed, as well as their job satisfaction as described in the Appendix.

## Statistical Analyses

We used North Carolina State Medical Licensure Board data to compare the demographic and practice characteristics of respondents and nonrespondents. Among the study sample, we conducted descriptive statistics of demographic, practice, and attitudinal features. We compared the characteristics of generalists and infectious disease specialists caring for patients with HIV/AIDS using  $\chi^2$  statistics and student's *t* test as appropriate.

We assessed the sample with regard to the following outcome variables: 1) the number of minutes spent counseling for a 3-drug regimen both a) when prescribing a new regimen and b) during routine follow-up; 2) how often (on a 5-point scale) each of the adherence counseling

behaviors (16 for prescribing a new regimen, and 8 for routine follow-up visits) were performed; and 3) the total number of the 16 adherence counseling behaviors performed for a new prescription “most” or “all of the time.” Although counseling during follow-up visits probably has an important influence on patient adherence, the primary outcome of interest in this analysis was “the number of adherence counseling behaviors performed for a new prescription.” We focused this analysis on new prescription initiation for 2 reasons: 1) when this study was conducted, more emphasis had been placed on recommended counseling approaches during initiation;<sup>1</sup> and 2) counseling behaviors conducted during prescription initiation are less variable and therefore easier to compare than are activities taking place during follow-up visits.

To understand the influence of time allocation on specific behaviors, we evaluated the proportion of respondents who carried out each counseling behavior, stratified by whether they reported having a “high” or “low” amount of time allocated to conduct a complete HIV/AIDS patient physical (dichotomized at 30 minutes, the median value).

Because our primary outcome variable, the number of behaviors performed for a new prescription, was a discrete scale, we conducted Poisson regression, using the PROC GENMOD procedure in SAS 8.0 (SAS Institute Inc., Cary, NC), to assess the bivariate associations between categorical physician characteristics and the outcome.<sup>38-40</sup> Then, multivariate Poisson regression was used to assess the independent relationship between potential predictor variables and the number of adherence counseling behaviors performed “most” or “all of the time” for a new 3-drug regimen,<sup>40</sup> correcting for overdispersion by using the PSCALE option in SAS.<sup>38-40</sup> The model was selected based on an *a priori* conceptualization of potential predictors of adherence practices, incorporating variables related to adherence in the bivariate analyses at  $P < .10$  and considering multicollinearity. Because medical specialty was both associated with adherence practices and highly correlated with many variables in the model, it was excluded from the model; to assess the effect of HIV/AIDS care experience, we included HIV patient volume instead.

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## RESULTS

### Demographic and Practice Characteristics of the Sample

Twenty-five percent of physicians in the sample were ID specialists, with 37% general internists, 28% family practitioners, and 10% other specialties (Table 1). A minority (36%) practiced in an academic institution. Over half cared for fewer than 10 HIV-positive patients; 25% cared for 3 or fewer. Respondents were more likely than nonrespondents

to be male, internists or family practitioners, and from a large, nonacademic group.

### Health System Characteristics and Physician Attitudes, Beliefs, and Knowledge

The majority (97% to 99%) of physicians viewed adherence counseling as their role and had positive attitudes toward both ART and HIV/AIDS patients. However, nearly half felt that they did not have enough time; only 10% felt adequately reimbursed; about half felt inadequately skilled; and over 25% did not have enough space to provide adherence counseling. On average, physicians reported having 38 minutes allocated (median 30 minutes) to carry out a complete history and physical for a patient with HIV/AIDS, substantially less than the 53 minutes they felt they needed.

### Adherence Counseling Practices

**Number of Minutes Spent.** On average, for a 3-drug regimen, physicians reported spending 13 minutes (SD [standard deviation] 9.4, median 10, range 0 to 60) counseling patients initiating therapy and 7.5 minutes (SD 7, median 5.0, range 0 to 60) counseling them during a follow-up visit.

**Adherence Counseling Behaviors Performed.** The vast majority (92% to 94%) of physicians reported providing basic dosing instructions “most” or “all of the time,” but a minority reported helping patients plan dose times, explain what to do if a dose was missed, suggest ways to remember doses, or ask the patient to repeat dosing instructions. A substantial minority did not explain drug interactions, tailor the regimen to the patient, or give advice about side effect management.

Half of physicians reported routinely carrying out 7 or fewer of the 16 adherence counseling behaviors.

### Relationship Between Adherence Counseling Practices and Amount of Time Allocated

In stratified analyses, practitioners who reported a greater amount of time allocated (over 30 minutes) to conduct a complete physical spent significantly more time counseling for a new prescription (14.8 minutes vs 11.4 minutes,  $P = .02$ ), but those allocated more time for a follow-up visit did not spend more time counseling in a follow-up visit.

Practitioners who had more time allocated were also more likely to carry out a greater number of the counseling behaviors for a new but not for a continuing prescription. For continuing prescriptions, practitioners who had more time allocated to conduct a follow-up visit were less likely to ask a case manager to counsel patients about adherence (Table 2).

### Characteristics of Generalists Compared with Infectious Disease Specialists

Not surprisingly, among the sample, infectious disease specialists differed from others caring for patients with

Table 1. Characteristics of North Carolina Physicians Caring for Patients with HIV

| Did Prescribe a Protease Inhibitor (Study Sample) N = 190                                |                    |
|--|--------------------|
| Demographic Factors  |                    |
| Mean age, y (range)  | 43 (30 to 69)      |
| Male, %  | 74                 |
| Ethnicity, %   |                    |
| White  | 76                 |
| African-American   | 11                 |
| Hispanic   | 3                  |
| Asian-American   | 7                  |
| Other  | 3                  |
| Medical Specialty, %   |                    |
| Family practice  | 28                 |
| Internal medicine  | 37                 |
| Infectious diseases  | 25                 |
| Other  | 10                 |
| Year graduated MD, mean  | 1985               |
| Board certified, %   | 79                 |
| Practice Characteristics   |                    |
| Type of practice, %  |                    |
| Solo   | 10                 |
| Small group (2 to 9 MDs)   | 34                 |
| Large (single or multispecialty) group   | 14                 |
| Large single specialty group (10 + MDs)  | 5                  |
| Large multispecialty group (10 + MDs)  | 9                  |
| Group/staff model HMO  | 1                  |
| Academic group practice  | 36                 |
| Other  | 5                  |
| Rural practice, %  | 23                 |
| Number of HIV-positive patients currently care for, mean number patients (median, range) | 59 (10, 0 to 1200) |
| Health System Factors  |                    |
| Time allocated for HIV physical, mean number minutes (median, range)                     | 38 (30, 10 to 120) |
| Time needed for HIV physical, mean number minutes (range)                                | 53 (10 to 120)     |
| I don't have enough time, % agree or strongly agree                                      | 46                 |
| I am adequately reimbursed, % agree or strongly agree                                    | 10                 |
| I am adequately skilled, % agree or strongly agree                                       | 54                 |
| I do not have enough space, % agree or strongly agree                                    | 28                 |
| Physician Attitudes/Belief/Knowledge   |                    |
| Adherence counseling is not physician's role, % agree or strongly agree                  | 1                  |
| ART is too much trouble, % agree or strongly agree                                       | 3                  |
| Negative attitudes toward patients with HIV, mean on a scale of 1 to 5 (range)           | 1.67 (1.0 to 4.2)  |
| Knowledge that nonadherence can cause resistance, % agree or strongly agree              | 98                 |
| Seen USPHS/IDSA Guidelines, % yes  | 76                 |
| Job satisfaction, % very satisfied   | 53                 |

HIV/AIDS (Table 3). Infectious disease doctors felt they needed, spent, and had allocated more time to provide high-quality care than did generalists. More generalists had time stress (i.e., needed more time than was allocated) than did infectious disease specialists, yet similar proportions felt that they did not have enough time to conduct adherence counseling (41% vs 49%,  $P = .13$ ). Although infectious disease specialists reported spending no more time counseling their patients about ART adherence, they did report performing significantly more adherence counseling behaviors (10.2 vs 7.6 for a new 3-drug regimen,  $P < .0001$ ). Although a greater proportion of infectious disease doctors felt adequately skilled to counsel about adherence, they did not differ from others regarding job satisfaction, attitudes toward HIV-positive patients, beliefs about their role, or attitudes regarding reimbursement for adherence counseling.

Of note, although we did not have adequate numbers of respondents to compare across all specialties, qualitatively, we found that internists and family practitioners performed similar counseling activities.

### Additional Bivariate Associations Between Physician Characteristics and Adherence Counseling Practices

In bivariate analyses, physicians who reported carrying out more adherence counseling were not only more likely to be infectious disease specialists, but also cared for more HIV-positive patients, had more time allocated to see HIV-positive patients, and perceived that they had enough time, office space, reimbursement, and skill to do adherence counseling (Table 4). Practitioners who agreed that



**Table 2. Proportion of Physicians Performing Adherence Counseling Activities Among All Physicians, Comparing Those with Low and High Time Allocated\***

|  | N   | Never or Rarely, % | Some of the Time, % | Most or All the Time, % | $\chi^2$ | P Value |
|--|-----|--------------------|---------------------|-------------------------|----------|---------|
| New prescriptions  |     |                    |                     |                         |          |         |
| Tailor the antiretroviral prescription to patient's daily routine. |     |                    |                     |                         |          |         |
| Low time allocated   | 107 | 18                 | 28                  | 54                      |          |         |
| High time allocated  | 73  | 7                  | 14                  | 79                      | 10.9     | .0010   |
| Explain the dosing schedule for each prescribed medication.        |     |                    |                     |                         |          |         |
| Low time allocated   | 107 | 4                  | 6                   | 90                      |          |         |
| High time allocated  | 72  | 0                  | 1                   | 98                      | 5.4      | .0200   |
| Explain the p.o. intake requirements of the regimen.               |     |                    |                     |                         |          |         |
| Low time allocated   | 90  | 13                 | 0                   | 87                      |          |         |
| High time allocated  | 70  | 4                  | 0                   | 95                      | 10.6     | .052    |
| Explain potential drug interactions.                               |     |                    |                     |                         |          |         |
| Low time allocated   | 105 | 11                 | 27                  | 62                      |          |         |
| High time allocated  | 73  | 5                  | 22                  | 73                      | 2.8      | .0945   |
| Ask patient to repeat or rehearse dosing instructions.             |     |                    |                     |                         |          |         |
| Low time allocated   | 105 | 36                 | 34                  | 30                      |          |         |
| High time allocated  | 73  | 20                 | 36                  | 44                      | 5.9      | .0149   |
| Help patient plan dosing times to fit his or her daily routine.    |     |                    |                     |                         |          |         |
| Low time allocated   | 106 | 36                 | 34                  | 30                      |          |         |
| High time allocated  | 73  | 15                 | 25                  | 60                      | 16.5     | .0001   |
| Discuss resistance or other consequences of non-adherence.         |     |                    |                     |                         |          |         |
| Low time allocated   | 103 | 5                  | 6                   | 89                      |          |         |
| High time allocated  | 73  | 0                  | 3                   | 97                      | 4.7      | .0305   |
| Provide written dosing instructions.                               |     |                    |                     |                         |          |         |
| Low time allocated   | 104 | 16                 | 21                  | 63                      |          |         |
| High time allocated  | 73  | 12                 | 22                  | 66                      | 0.41     | .5196   |
| Suggest strategies to remember when to take antiretrovirals.       |     |                    |                     |                         |          |         |
| Low time allocated   | 105 | 39                 | 30                  | 30                      |          |         |
| High time allocated  | 73  | 12                 | 39                  | 40                      | 13.6     | .0002   |
| Advise patients about ways to manage ART side effects.             |     |                    |                     |                         |          |         |
| Low time allocated   | 107 | 19                 | 33                  | 49                      |          |         |
| High time allocated  | 73  | 7                  | 21                  | 73                      | 10.6     | .0012   |
| Explain what to do if a dose is missed.                            |     |                    |                     |                         |          |         |
| Low time allocated   | 105 | 38                 | 29                  | 33                      |          |         |
| High time allocated  | 73  | 12                 | 33                  | 55                      | 14.1     | .0002   |
| Provide a pill box or pill organizer with compartments.            |     |                    |                     |                         |          |         |
| Low time allocated   | 105 | 62                 | 24                  | 14                      |          |         |
| High time allocated  | 73  | 41                 | 32                  | 27                      | 8.7      | .0032   |
| Ask if patient has questions or concerns about their treatment.    |     |                    |                     |                         |          |         |
| Low time allocated   | 105 | 2                  | 7                   | 91                      |          |         |
| High time allocated  | 73  | 0                  | 4                   | 96                      | 1.8      | .1763   |
| Ask a nurse to counsel a patient about adherence.                  |     |                    |                     |                         |          |         |
| Low time allocated   | 105 | 64                 | 14                  | 22                      |          |         |
| High time allocated  | 72  | 60                 | 14                  | 26                      | 0.43     | .5077   |
| Ask a pharmacist to counsel a patient about adherence.             |     |                    |                     |                         |          |         |
| Low time allocated   | 103 | 62                 | 14                  | 24                      |          |         |
| High time allocated  | 73  | 69                 | 14                  | 18                      | 1.03     | .3099   |
| Phone patient to follow up on antiretroviral use or side effects.  |     |                    |                     |                         |          |         |
| Low time allocated   | 103 | 67                 | 22                  | 11                      |          |         |
| High time allocated  | 71  | 63                 | 27                  | 10                      | 0.07     | .7890   |
| Refill prescriptions   |     |                    |                     |                         |          |         |
| Ask whether the patient experienced side-effects.                  |     |                    |                     |                         |          |         |
| Low time allocated   | 116 | 0                  | 8                   | 92                      |          |         |
| High time allocated  | 62  | 0                  | 3                   | 97                      | 1.42     | .2328   |

(Continued)

Table 2. (Continued)

|  | N   | Never or Rarely, % | Some of the Time, % | Most or All the Time, % | $\chi^2$ <sup>†</sup> | P Value |
|--|-----|--------------------|---------------------|-------------------------|-----------------------|---------|
| Asked whether antiretrovirals were being taken on time.                              |     |                    |                     |                         |                       |         |
| Low time allocated   | 116 | 5                  | 12                  | 83                      |                       |         |
| High time allocated  | 62  | 7                  | 7                   | 87                      | 0.08                  | .7760   |
| Reviewed dosing instruction for the regimen with the patient.                        |     |                    |                     |                         |                       |         |
| Low time allocated   | 115 | 8                  | 19                  | 73                      |                       |         |
| High time allocated  | 61  | 3                  | 18                  | 79                      | 1.21                  | .2710   |
| Ask about barriers that make it hard to take antiretrovirals.                        |     |                    |                     |                         |                       |         |
| Low time allocated   | 115 | 16                 | 36                  | 49                      |                       |         |
| High time allocated  | 61  | 10                 | 26                  | 64                      | 3.42                  | .0643   |
| Warn patient you would stop therapy if antiretrovirals were not taken as prescribed. |     |                    |                     |                         |                       |         |
| Low time allocated   | 113 | 29                 | 24                  | 47                      |                       |         |
| High time allocated  | 61  | 34                 | 25                  | 41                      | 0.66                  | .4162   |
| Ask a nurse to counsel at follow-up.   |     |                    |                     |                         |                       |         |
| Low time allocated   | 113 | 69                 | 14                  | 17                      |                       |         |
| High time allocated  | 61  | 64                 | 16                  | 20                      | 0.32                  | .5714   |
| Ask a pharmacist to counsel at follow-up.  |     |                    |                     |                         |                       |         |
| Low time allocated   | 115 | 70                 | 15                  | 16                      |                       |         |
| High time allocated  | 61  | 67                 | 20                  | 27                      | 0.00                  | .9874   |
| Ask a case manager to counsel.   |     |                    |                     |                         |                       |         |
| Low time allocated   | 111 | 72                 | 16                  | 12                      |                       |         |
| High time allocated  | 60  | 53                 | 20                  | 27                      | 7.5                   | .0063   |

\* High and low time allocated are defined as above and below 30 minutes, which is the median time allocated to see patients.

<sup>†</sup> Cochran-Mantel Haenszel statistic, comparing physicians with low time allocated and physicians with high time allocated.

P.O., per oral route; ART, antiretroviral therapy.

antiretroviral therapy was “too much trouble for patients” reported counseling about adherence less than those who disagreed. Physicians who reported seeing the USPHS guidelines for initiating ART reported carrying out more adherence counseling.

### Multivariate Results: Factors Independently Associated with the Number of Adherence Counseling Practices Carried Out When Prescribing a New Regimen

In the final multivariate model, physicians who were significantly more likely to perform a greater number of adherence counseling practices were those who 1) cared for greater numbers of HIV/AIDS patients; 2) had more time allocated for an HIV physical; 3) felt more adequately skilled; and 4) had more positive attitudes toward ART (Table 5).

## DISCUSSION

National practice guidelines now recommend that physicians regularly facilitate their patients' antiretroviral adherence.<sup>1</sup> The findings from this first statewide investigation of physicians' ART adherence counseling practices

suggest that many patients living with HIV/AIDS may not be receiving these recommended services from their physicians. Not only did physicians report not counseling their HIV-positive patients comprehensively about ART adherence, but also, large proportions felt that they had inadequate skill, reimbursement, space, or time to conduct adherence counseling, all factors associated with counseling less. Half of our sample cared for relatively small numbers of patients with HIV.

These findings suggest important targets to improve care. The physician's role in caring for patients with chronic illnesses such as HIV infection has evolved.<sup>1,3</sup> Recent studies indicate that many physicians perceive that they are required to see more patients in less time,<sup>41,42</sup> yet are being asked to take on more responsibility for facilitating behavior change among growing numbers of patients coping with chronic illnesses.<sup>43-51</sup> Our finding that the more time allocated, the more comprehensive is the physician's counseling indicates that medical directors may need to allot more time for comprehensive visits, particularly to treat patients with HIV/AIDS. Although physician time is expensive, the benefits of potentially slowing the emergence of widespread drug-resistant virus may outweigh this cost in the long term.<sup>52,53</sup> The finding that many physicians felt inadequately skilled to provide adherence counseling

Table 3. Comparison of Physician Practice and Attitudinal Characteristics for Infectious Disease Specialists and Non-ID Specialists\*

|   | ID Specialists |                |                  | Non-ID |                |                    | P Value |
|---|----------------|----------------|------------------|--------|----------------|--------------------|---------|
|   | N              | Mean or % (SD) | Median (range)   | N      | Mean or % (SD) | Median (range)     |         |
| Demographics and Practice   |                |                |                  |        |                |                    |         |
| Male, %   | 40             | 80             |                  | 117    | 72             |                    | .31     |
| Mean age, y   | 40             | 44 (7.9)       | 44 (31 to 59)    | 117    | 41 (7.3)       | 41 (28 to 69)      | .04     |
| Ethnicity, %  | 39             | 90             |                  | 116    | 72             |                    | .07     |
| White   |                |                |                  |        |                |                    |         |
| African-American  |                | 0              |                  |        | 15             |                    |         |
| Asian   |                | 8              |                  |        | 6              |                    |         |
| Hispanic  |                | 0              |                  |        | 4              |                    |         |
| Rural practice, %   | 40             | 5              |                  | 118    | 23             |                    | .012    |
| HIV-positive patients currently care for, N (mean)                          | 40             | 176 (210)      | 135 (15 to 1200) | 116    | 17 (25.6)      | 6.0 (0 to 150)     | < .0001 |
| Clinical Practices  |                |                |                  |        |                |                    |         |
| For a new regimen   |                |                |                  |        |                |                    |         |
| Time spent counseling, minutes (mean)                                       | 39             | 12.4 (5.9)     | 10.0 (3 to 30)   | 107    | 13.2 (10.9)    | 10.0 (0 to 60)     | .56     |
| Number of adherence counseling behaviors (mean)                             | 40             | 10.2 (2.43)    | 11 (6 to 14)     | 115    | 7.6 (3.56)     | 8.0 (0 to 15)      | < .0001 |
| During a follow-up visit  |                |                |                  |        |                |                    |         |
| Time spent counseling, minutes (mean)                                       | 39             | 7.3 (5.5)      | 5.0 (1 to 30)    | 107    | 7.3 (7.4)      | 5.0 (0 to 60)      | .98     |
| Number of adherence counseling behaviors                                    | 40             | 4.13 (1.52)    | 4 (1 to 8)       | 115    | 3.78 (1.79)    | 4.0 (0 to 8)       | .24     |
| For a complete HIV physical   |                |                |                  |        |                |                    |         |
| Time allocated, minutes (mean)  | 40             | 49.6 (16.0)    | 52.5 (20 to 90)  | 111    | 34.8 (15.7)    | 30.0 (10 to 120)   | < .0001 |
| Time spent, minutes (mean)  | 40             | 55.9 (180)     | 60 (30 to 90)    | 110    | 43.1 (16.4)    | 45.0 (10 to 20)    | < .0001 |
| Time needed, minutes (mean)   | 40             | 61 (21.6)      | 60 (30 to 120)   | 110    | 51.5 (18.3)    | 45 (10 to 120)     | .0085   |
| For routine HIV follow-up   |                |                |                  |        |                |                    |         |
| Time allocated, minutes (mean)  | 40             | 20.25 (6.4)    | 17.5 (15 to 30)  | 110    | 17.7 (7.11)    | 15.0 (5.0 to 60.0) | .049    |
| Time spent, minutes (mean)  | 40             | 23.5 (8.4)     | 20.0 (7.5 to 45) | 108    | 22.3 (7.6)     | 20.0 (10 to 60)    | .42     |
| Time needed, minutes (mean)   | 40             | 26.5 (9.7)     | 30.0 (15 to 45)  | 108    | 26.16 (10.3)   | 30.0 (10 to 60)    | .85     |
| Health System Factors   |                |                |                  |        |                |                    |         |
| I don't have enough time, % agree or strongly agree                         | 39             | 41             |                  | 115    | 49             |                    | .13     |
| I am adequately reimbursed, % agree or strongly agree                       |                | 38             | 0                |        | 115            | 13                 | .21     |
| I am adequately skilled, % agree or strongly agree                          | 40             | 78             |                  | 114    | 47             |                    | < .0003 |
| I do not have enough space, % agree or strongly agree                       | 38             | 32             |                  | 113    | 28             |                    | .54     |
| Job satisfaction, % very satisfied  | 39             | 59             |                  | 115    | 50             |                    | .35     |
| Physician Attitudes/Belief/Knowledge  |                |                |                  |        |                |                    |         |
| Not physician's role, % agree or strongly agree                             | 39             | 3              |                  | 113    | 0              |                    | .23     |
| ART is too much trouble, % agree or strongly agree                          | 39             | 3              |                  | 114    | 4              |                    | .14     |
| Knowledge that nonadherence can cause resistance, % agree or strongly agree | 40             | 98             |                  | 114    | 99             |                    | .63     |
| Seen USPHS/IDSA guidelines, % saying yes                                    | 40             | 100            |                  | 113    | 69             |                    | < .0001 |
| Negative attitudes toward HIV-positive patients (mean on a scale of 1 to 5) | 40             | 1.63           |                  | 114    | 1.68 (0.59)    |                    | .65     |

\*  $\chi^2$  statistics used for categorical variables; student's t test used for continuous variables.

Table 4. Associations Between Physician Characteristics and Adherence Counseling Practices

|  | Risk Ratio* or Correlation Coefficient | P Value |
|--|--|---------|
| Demographic Factors                                |  |         |
| Age, y   | $r = -.10$                             | .17     |
| Gender   | 1.294                                  | .13     |
| Male   | –                                      | –       |
| Female   | –                                      | –       |
| Ethnicity  |  |         |
| African-American                                   | 0.78                                   | .31     |
| Hispanic   | 1.17                                   | .73     |
| Asian-American                                     | 0.83                                   | .56     |
| Other  | 1.01                                   | .98     |
| White <sup>†</sup>                                 | –                                      | –       |
| Medical Specialty                                  |  |         |
| Noninfectious diseases                             | 0.487                                  | < .0001 |
| Infectious diseases <sup>†</sup>                   | –                                      | –       |
| Year graduated MD                                  | $r = -.06$                             | .18     |
| Board certified                                    |  |         |
| Yes  | 1.07                                   | .73     |
| No <sup>†</sup>                                    | –                                      | –       |
| Practice Characteristics                           |  |         |
| Type of practice                                   |  |         |
| Group/staff model HMO                              | 0.646                                  | .55     |
| Small group (2 to 9 MD)                            | 0.738                                  | .08     |
| Large group (10 + MDs)                             | 0.877                                  | .55     |
| Solo   | 0.968                                  | .90     |
| Other  | 0.734                                  | .44     |
| Academic group practice <sup>†</sup>               | –                                      | –       |
| Rural practice                                     | 1.05                                   | .77     |
| Number of HIV-positive patients currently care for | $r = .29$                              | < .0001 |
| Health Care System Barriers                        |  |         |
| Minutes allocated for complete HIV physical        |  |         |
| High   |  |         |
| Low  |  |         |
| I don't have enough time                           |  |         |
| Strongly disagree                                  | 2.19                                   | .03     |
| Disagree   | 2.03                                   | .01     |
| Neutral  | 1.29                                   | .37     |
| Agree  | 1.26                                   | .39     |
| Strongly agree <sup>†</sup>                        | –                                      | –       |
| I am adequately reimbursed                         |  |         |
| Strongly disagree                                  | 0.451                                  | .06     |
| Disagree   | 0.487                                  | .09     |
| Neutral  | 0.378                                  | .03     |
| Agree  | 0.558                                  | .222    |
| Strongly agree <sup>†</sup>                        | –                                      | –       |
| I am adequately skilled                            |  |         |
| Strongly disagree                                  | 0.223                                  | .0003   |
| Disagree   | 0.497                                  | .0033   |
| Neutral  | 0.329                                  | .001    |
| Agree  | 0.697                                  | .076    |
| Strongly agree <sup>†</sup>                        | –                                      | –       |
| I do not have enough space                         |  |         |
| Strongly disagree                                  | 1.83                                   | .04     |
| Disagree   | 1.23                                   | .45     |
| Neutral  | 0.90                                   | .74     |
| Agree  | 1.055                                  | .86     |
| Strongly agree <sup>†</sup>                        | –                                      | –       |
| Job Satisfaction                                   |  |         |
| Very satisfied                                     | 0.503                                  | .22     |
| Moderately satisfied                               | 0.293                                  | .03     |
| Neither satisfied nor unsatisfied                  | 0.324                                  | .16     |
| Moderately unsatisfied                             | 0.571                                  | .40     |
| Very unsatisfied <sup>†</sup>                      | –                                      | –       |

(Continued)



Table 4. (Continued)

|  | Risk Ratio* or Correlation Coefficient | P Value |
|--|--|---------|
| Physician Attitudes/Belief/Knowledge         |  |         |
| Not physician's role                         |  |         |
| Strongly disagree                            | 0.622                                  | .58     |
| Disagree                                     | 0.440                                  | .34     |
| Neutral                                      | 0.193                                  | .09     |
| Agree  | 2.37                                   | .51     |
| Strongly agree <sup>†</sup>                  | –                                      | –       |
| Negative beliefs of patients                 | $r = -.14$                             | .06     |
| ART is too much trouble                      |  |         |
| Strongly disagree <sup>†</sup>               | –                                      | –       |
| Disagree                                     | 0.88                                   | .08     |
| Neutral                                      | 0.62                                   | .02     |
| Agree  | 0.17                                   | .01     |
| Strongly agree                               | 1.23                                   | .26     |
| Knowledge: nonadherence can cause resistance |  |         |
| Strongly disagree                            | –                                      | –       |
| Disagree                                     | 0.168                                  | .20     |
| Neutral                                      | 1.794                                  | .34     |
| Agree  | 0.820                                  | .23     |
| Strongly agree <sup>†</sup>                  | –                                      | –       |
| Seen guidelines                              |  |         |
| No   | 0.524                                  | .0003   |
| Yes <sup>†</sup>                             | –                                      | –       |

\* Based on results of Poisson regression.

<sup>†</sup> Reference category.

is consistent both with prior studies demonstrating physicians' limited abilities to assess nonadherence<sup>54</sup> and with the limited training that physicians receive in health behavior change techniques.<sup>47,48</sup> To meet their evolving role successfully as practitioners, continuing education and training in the required skills are needed.<sup>29</sup>

It was somewhat surprising to find that financial reimbursement was unrelated to physicians' performance of adherence counseling, because other physician behaviors have been linked to economic incentives in prior studies.<sup>55,56</sup> However, we may have missed a true link between counseling and reimbursement because the perceived insufficiency of reimbursement was so uniform: 90% of physicians agreed that they were not adequately reimbursed for adherence counseling.

Finally, the questions of how best to allocate resources and responsibilities to enhance patients' antiretroviral medication adherence, particularly in rural states, warrant further study. Patients who better understand their ART regimen are more adherent.<sup>57</sup> Because HIV treatment is medically complex,<sup>3</sup> physicians are in a unique position to initially inform and counsel patients about their regimen. However, consistent with prior studies showing an association between greater HIV caseload and better care,<sup>27-31</sup> we found that physicians caring for fewer HIV-positive patients reported providing less comprehensive adherence counseling. These results, coupled with our finding that most physicians caring for patients with HIV in North Carolina were generalists, most of whom care for fewer than 10 HIV-infected patients, has important implications. More extensive, tailored programs may be needed to augment current

continuing medical education about ART for low-volume providers.<sup>29,58-62</sup> Additionally, a multidisciplinary system of care that integrates the skills of nurses, case managers, and pharmacists with those of physicians may provide the most cost-effective, high-quality services.<sup>58</sup>

The findings of this study must be interpreted in light of its limitations. Because this is a cross-sectional survey, the endogeneity inherent in the associations found limits the ability to provide strong evidence of a causal relationship. For example, although we assume that physicians' positive attitudes and confidence in their skills may enhance their behavior, it is possible that physicians who counsel patients more comprehensively will feel more sufficiently skilled and have more positive attitudes toward ART as a result. Second, measurement error in the form of recall or social desirability bias may have reduced the validity of the self-reported adherence counseling measures. Although we confirmed the construct validity of these measures and the correlation with physician experience is consistent with expected group differences, we could not assess observed physician behavior. Further, the self-report measure we used to assess the amount of time physicians spent counseling is subject to the same biases. However, measurement bias would likely have overestimated our outcome, implying that adherence counseling may be even less comprehensive than our results indicate. In addition, understanding physicians' perceptions of and attitudes toward adherence counseling is important and can only be obtained through self-report.

Third, our North Carolina sample may not represent all physicians in the United States caring for patients with HIV/

**Table 5. Multivariate Model of Factors that Predict the Number of Adherence Counseling Tasks Performed by Physicians\***

| Variable                                      | RR   | 95% CI       |
|---|------|--------------|
| Number of HIV+ patients care for <sup>†</sup> | 1.08 | 1.01 to 1.13 |
| Minutes allocated for complete HIV physical   |      |              |
| High  | 1.14 | 1.01 to 1.28 |
| Low   | –    | –            |
| I am adequately skilled                       |      |              |
| Strongly disagree                             | 0.63 | 0.43 to 0.92 |
| Disagree                                      | 0.81 | 0.65 to 1.01 |
| Neutral                                       | 0.76 | 0.61 to 0.94 |
| Agree   | 0.97 | 0.81 to 1.15 |
| Strongly agree <sup>‡</sup>                   | –    | –            |
| I am adequately reimbursed                    |      |              |
| Strongly disagree                             | 0.81 | 0.58 to 1.15 |
| Disagree                                      | 0.79 | 0.56 to 1.11 |
| Neutral                                       | 0.66 | 0.46 to 0.95 |
| Agree   | 0.82 | 0.56 to 1.20 |
| Strongly agree <sup>‡</sup>                   | –    | –            |
| I do not have enough space                    |      |              |
| Strongly disagree                             | 1.16 | 0.91 to 1.48 |
| Disagree                                      | 0.98 | 0.78 to 1.23 |
| Neutral                                       | 0.90 | 0.69 to 1.18 |
| Agree   | 0.93 | 0.73 to 1.19 |
| Strongly agree <sup>‡</sup>                   | –    | –            |
| ART is too much trouble                       |      |              |
| Strongly disagree <sup>‡</sup>                | –    | –            |
| Disagree                                      | 1.01 | 0.86 to 1.17 |
| Neutral                                       | 0.87 | 0.59 to 1.27 |
| Agree   | 0.22 | 0.06 to 0.74 |
| Strongly agree                                | 1.43 | 0.98 to 2.07 |

\* Based on results of Poisson regression.

<sup>†</sup> Risk ratio for every increase in patient volume by 60 patients.

<sup>‡</sup> Reference category

RR, relative risk; CI, confidence interval.

AIDS, and consequently our findings may not generalize to others. Furthermore, our response rate of 63% is slightly better than the average rate for mailed physician surveys,<sup>63</sup> but physicians who were interested in adherence counseling were probably more likely to respond to this survey. If so, this bias would lead us to underestimate the sub-optimal nature of adherence counseling. Finally, although a previously validated method was used to identify the sample,<sup>32</sup> the use of a commercial prescription-tracking database resulted in sending surveys to 167 physicians who did not provide ongoing care to patients with HIV/AIDS. We eliminated those who were ineligible by asking all respondents whether they had prescribed a protease inhibitor (PI) in the last year, but we may have missed some eligible physicians, probably those who cared for fewer patients with HIV. We speculate that this might occur either because they did not prescribe a PI for their HIV-positive patients or because their medical partner's name was included in the tracking database in place of theirs. Therefore, our sample may underrepresent physicians who have smaller HIV caseloads.

Despite these limitations, this first comprehensive description of physicians' reports of their adherence counseling practices suggests that the growing pressure that physicians experience to "do more in less time" may reach a limit, unless addressed by providing practitioners with additional time, training, and/or resources to counsel their patients about adherence.

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## REFERENCES

- Centers for Disease Control and Prevention. Guidelines for using antiretroviral agents among HIV-infected adults and adolescents: recommendations of the Panel on Clinical Practices for treatment of HIV. *MMWR*. 2002;51(RR-7):8–10.
- Weinstein MC, Goldie SJ, Losina E, et al. Use of genotypic resistance testing to guide HIV therapy: clinical impact and cost-effectiveness. *Ann Intern Med*. 2001;134:440–50.
- Henry K. The case for more cautious, patient-focused antiretroviral therapy. *Ann Intern Med*. 2000;132:306–11.
- Anderson L. Health care communication and selected psychological adherence in diabetes management. *Diabetes Care*. 1990;13:66–7.
- Rost K. The influence of patient participation on satisfaction and compliance. *Diabetes Educ*. 1989;15:134–8.
- Street R, Piziak V, Carpentier W, Herzog J, Hejl J. Provider-patient communication and metabolic control. *Diabetes Care*. 1993;16:714–21.
- Kaplan SM, Greenfield S, Ware J. Assessing the effects of physician-patient interaction on the outcomes of chronic disease. *Med Care*. 1989;27:110–27.
- Stewart M. What is a successful doctor-patient interview? A study of interactions and outcomes. *Soc Sci Med*. 1984;19:167–75.
- Rost K, Carter WI. Introduction of information during the initial medical visit: consequences for patient follow-through with physician recommendations for medication. *Soc Sci Med*. 1989;28:315–21.
- Greenfield S, Kaplan SH, Ware JE Jr, Yano EM, Frank HJ. Patients' participation in medical care: Effects on blood sugar control and quality of life in diabetes. *J Gen Intern Med*. 1988;3:448–57.
- Korsch B, Gozzi E, Francis V. Gaps in doctor-patient communication: Doctor-patient interaction and patient satisfaction. *Pediatrics*. 1968;42:855–71.
- Roter D, Hall J. *Doctors Talking with Patients/Patients Talking with Doctors*. Westport, Conn: Auburn House; 1993.
- Murphy D, Murphy DA, Roberts KJ, Martin DJ, Marelich W, Hoffman D. Barriers to antiretroviral adherence among HIV-Infected adults. *AIDS Patient Care STDs*. 2000;14:47–58.
- Golin CE, Isasi F, Breny Bontempi J, Eng G. Secret pills: HIV-positive patients' experiences taking antiretroviral therapy in North Carolina, submitted AIDS Education Prevention.
- Sleath B, Roter D, Chewing B, Svarstad B. Asking questions about medication: analysis of physician-patient interactions and physician perceptions. *Med Care*. 1999;37:1169–73.
- Hall JA, Roter DL, Katz NR. Meta-analysis of correlates of provider behavior in medical encounters. *Med Care*. 1988;6:657–75.
- Gordillo V, del Amo J, Soriano V, Gonzalez-Lahoz J. Sociodemographic and psychological variables influencing adherence to antiretroviral therapy. *AIDS*. 1999;13:1763–9.
- Paterson L, Swindells S, Mohr J, et al. Adherence to protease inhibitor therapy and outcomes in patients with HIV infection. *Ann Intern Med*. 2000;133:21–30.

19. Golin CE, Kaplan A, Liu HH, et al. Patient Factors Associated with and Self-reported Reasons for Nonadherence to Antiretroviral Therapy. Society for General Internal Medicine 22nd Annual Meeting, San Francisco, May 1, 1999.
20. Catz S, Kelly J, Bogart L, Benotsch E, McAuliffe T. Patterns, correlates, and barriers to medication adherence among persons prescribed new treatments for HIV disease. *Health Psychol.* 2000;19:124–33.
21. Chesney M, Ickovics J, Chambers D, et al. Self-reported adherence to antiretroviral medications among participants in HIV clinical trials: the AACTG adherence Instruments. *AIDS Care.* 2000;12:255–66.
22. Kalichman SC, Ramachandran B, Catz S. Adherence to combination antiretroviral therapies in HIV patients of low health literacy. *J Gen Intern Med.* 1999;14:267–73.
23. Laws MB, Wilson RB, Bowser DM, Kerr S. Taking antiretroviral therapy for HIV infection: learning from patients' stories. *J Gen Intern Med.* 2000;15:848–58.
24. Gifford A, Bormann J, Shively M, et al. Predictors of self-reported adherence and plasma HIV concentration in patients on multidrug antiretroviral regimens. *J Acquir Immune Defic Syndr.* 2000;23:386–95.
25. Meystre-Agustoni G, Dubois-Arber F, Cochand P, Telenti A. Antiretroviral therapies from the patient's perspective. *AIDS Care.* 2000;12:717–21.
26. Turner B, Newschaffer C, Zhang D, Cosler L, Hauck W. Antiretroviral use and pharmacy-based measurement of adherence in postpartum HIV infected women. *Med Care.* 2000;38:911–25.
27. Kitahata MM, Koepsell TD, Deyo RA, et al. Physicians' experience with the acquired immunodeficiency syndrome as a factor in patients' survival. *N Engl J Med.* 1996;334:701–6.
28. Kitahata MM, Van Rompaey SE, Shields AW. Physician experience in the care of HIV-infected persons is associated with earlier adoption of new antiretroviral therapy. *JAIDS.* 2000;24:106–14.
29. Hecht FM, Wilson IB, Wu AW, Cook RL, Turner BJ. Optimizing care for persons with HIV infection. *Ann Intern Med.* 1999;131:136–43.
30. Markson LE, Turner BJ, Crocroft J, Houchens R, Fanning TR. Clinic services for persons with AIDS. Experience in a high-prevalence state. *J Gen Intern Med.* 1997;12:141–9.
31. Stone VE, Mansourati FF, Poses RM, Mayer KH. Relation of physician specialty and HIV/AIDS experience to choice of guideline-recommended antiretroviral therapy. *J Gen Intern Med.* 2001;16:360–8.
32. Bach PB, Calhoun EA, Bennett CL. Identifying providers of care to individuals with human immunodeficiency virus for a mail survey using a prescription tracking database. *J Clin Epidemiol.* 1999;52:147–50.
33. United States Pharmacopeial Convention. USP Medication Counseling Behavior Guidelines, USP DI Update Vols I and II, 664–75.
34. Healthcare Solutions Series Level 3. Arlington, Va: Claritas, Inc; 2000.
35. Department of Health and Human Services. Area Resource File 2000 Washington (DC): Office of Research and Planning Bureau of Health Professions Health Resources and Services Administration. Washington, DC: Department of Health and Human Services; February 2000.
36. Linzer M, Konrad TR, Douglas J, et al. Managed care, time pressure, and physician job satisfaction: results from the physician worklife study. *J Gen Intern Med.* 2000;15:441–50.
37. Katz MD, Draugalis JR, Lai RP. HIV infection, AIDS: attitudes and knowledge of Arizona pharmacists. *Ann Pharmacother.* 1995;29:1218–23.
38. Jones AM. Health econometrics. In: Culyer AJ, Newhouse JP, eds. *Handbook of Health Economics.* Amsterdam: North Holland; 2000: 265–344.
39. Liao TF. Interpreting Probability Models. Logit, Probit, and Other Generalized Linear Models: Sage University Paper Series, Quantitative Applications in the Social Sciences #101. Thousand Oaks, Calif.: Sage Publications; 1994.
40. Allison PD. Poisson regression. In: *Logistic Regression: Using the SAS System Theory and Application.* 223–5.
41. Campion EW. A symptom of discontent. *N Engl J Med.* 2001;334:223–5.
42. Mechanic D. How should hamsters run? Some observations about sufficient patient time in primary care. *BMJ.* 2001;323:266–8.
43. Druss BG, Marcus SC, Olfson M, et al. Comparing the national economic burden of five chronic conditions. *Health Aff (Millwood).* 2001;20:233–41.
44. Knight M, Stewart-Brown S, Fletcher L. Estimating health needs: the impact of a checklist of conditions and quality of life measurement on health information derived from community surveys. *J Public Health Med.* 2001; 23:179–86.
45. Geiss LS, Herman WH, Goldschmid MG, et al. Surveillance for diabetes mellitus – United States, 1980–89. *CDC Surveillance Summaries. Morb Mortal Wkly Rep.* 1993;42:1–20.
46. Collins JG. Prevalence of selected chronic conditions: United States, 1990–92. *Vital & Health Statistics – Series 10.* Data from the National Health Survey. 1997;194:1–89.
47. Bluespruce J, Dodge WT, Grothaus L, et al. HIV prevention in primary care: impact of a clinical intervention. *AIDS Patient Care STDs.* 2001;15:243–53.
48. Yeager KK, Donehoo RS, Macera CA, et al. Health promotion practices among physicians. *Am J Prev Med.* 1996;12:238–41.
49. Gill JM. Physician performance of preventive care for women. *Del Med J.* 1996;68:349–55.
50. Marvel MK, Schilling R, Doherty WJ, Baird MA. Levels of physician involvement with patients and their families: a model for teaching and research. *J Fam Pract.* 1994;39:535–44.
51. CDC Semiannual HIV/AIDS Surveillance Report, 2001.
52. Freedberg KA, Losina E, Weinstein MC, et al. The cost-effectiveness of combination antiretroviral therapy for HIV disease. *N Engl J Med.* 2001;344:824–31.
53. Bozette SA, Joyce G, McCaffrey DF, et al. Expenditures for the care of HIV-infected patients in the era of highly active antiretroviral therapy. *N Engl J Med.* 2001;344:817–23.
54. Miller LG, Liu HH, Hays RD, et al. How well do clinicians estimate patients' adherence to combination antiretroviral therapy? *J Gen Intern Med.* 2002;17:1–11.
55. Armour BS, Pitts MM, Maclean R, et al. The effect of explicit financial incentives on physician behavior. *Arch Intern Med.* 2001;161:1261–6.
56. Tufano J, Conrad DA, Sales A, et al. Effects of compensation method on physician behaviors. *Am J Manag Care.* 2001;7:363–73.
57. Miller LG, Liu H, Hays RD, et al. Knowledge of antiretroviral regimen dosing and adherence: a longitudinal study. *Clin Infect Dis.* 2003;36:514–8.
58. Smith SS, Reif S, Golin C. Collaborations between case managers and pharmacists in HIV/AIDS care. APHA 129th Annual Meeting, Atlanta, Ga., October 21–25, 2001.
59. Holmes WC. Quality in HIV/AIDS care: Specialty-related or experience-related? *J Gen Intern Med.* 1997;12:195–7.
60. Landon B, Wilson I, Wenger N, et al. Specialty training and specialization among physicians who treat HIV/AIDS in the United States. *J Gen Intern Med.* 2002;17:12–22.
61. Epstein RM, Levenkron JC, Frarey L, et al. Improving physicians' HIV risk-assessment skills using announced and unannounced standardized patients. *J Gen Intern Med.* 2001;16:176–80.
62. Brandon W. Changing treatment regimens for HIV infection: impact on referral patterns and training needs of family physicians. *J Am Board Fam Pract.* 1999;12:115–9.
63. Carpenter CCJ, Cooper DA, Fischl MA, et al. Antiretroviral therapy for HIV infection in 1998: updated recommendations of the International AIDS Society—USA Panel. *JAMA.* 2000;283:381–90.

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**APPENDIX****Measures of Potential Health System and Attitudinal Barriers to ART Adherence Counseling**

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*Health System Barriers*

Please estimate the average time (in minutes) allocated to you, actually spent, and the amount of time you feel would be needed to provide high-quality care for your HIV/AIDS patients for a complete physical/consultation for: 1) a complete physical/consultation visit; and 2) a routine follow-up visit.<sup>36</sup>

Please indicate how strongly you agree or disagree with the following statements about your HIV/AIDS patients (response options: strongly disagree, disagree, neutral, agree, strongly agree):

*Health System Barriers*

- 1) I do not have enough time to provide adherence counseling
- 2) I am adequately skilled to provide adherence counseling
- 3) I am adequately reimbursed for providing adherence counseling
- 4) There is not enough space in my clinic or office to provide adherence counseling.

*Attitudes,<sup>37</sup> Beliefs, and Knowledge*

- 1) Taking combination therapy is too much trouble for what my patients get out of it.
- 2) It is not a physician's role to counsel patients about adherence.
- 3) It is harder for me to feel as much empathy for my HIV/AIDS patients than for my other patients.
- 4) If given a choice, I would prefer not to treat patients who have substance abuse problems.
- 5) If given a choice, I would prefer not to treat patients who are receiving public assistance.
- 6) I am concerned that working with HIV/AIDS patients endangers my personal health.
- 7) If given a choice, I would prefer not to treat gay men.

*Provider Knowledge of HIV*

- 1) If patients do not take their antiretrovirals as prescribed, drug resistance will develop.

*Provider Knowledge of HIV*

- 1) Have you seen the U.S. Public Health Service or Infectious Disease Society of America guidelines for HIV treatment? (response options: yes, no, unsure)

*Provider Job Satisfaction*

How satisfied are you with your work as a physician?<sup>36</sup>

(Very satisfied, moderately satisfied, neither satisfied nor unsatisfied, moderately unsatisfied, very unsatisfied)

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