



**C.H.A.I.N. REPORT**

*Update Report #36*

Pathways to  
Systems of  
HIV Medical Care in  
New York City

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## **Executive Summary**

There are several distinct “systems” of health care in New York City serving the adult HIV+ population. For the purposes of this report we have characterized these systems based on the dominant medical pathways reported by CHAIN respondents from 1994 through 2001. The dominant pathways are composed of:

1. Individuals whose dominant medical provider over time is at a NYC public Health & Hospitals Corporation (HHC) hospital or clinic;
2. Individuals whose dominant medical provider over time is at a private, voluntary hospital facility or clinic;
3. Individuals whose dominant medical provider over time is at a neighborhood health center or at a drug treatment center;
4. Individuals whose dominant medical provider over time is at a private medical practice, whether it is a solo or a group practice;
5. Individuals who move from system to system, such that no one medical provider type predominates;
6. And individuals who report no medical provider.

A number of earlier CHAIN reports have examined how patterns or specific elements of NYC’s health care infrastructure or models of care have been related to specific individual outcomes. Individuals who reported Ryan White-funded medical providers were significantly more likely to have appropriate medical care than were individuals with non-Ryan White funded medical providers [*CHAIN Update Report #35*]. Individuals who were nominally part of comprehensive systems of care – such as those that provide ancillary services or treatment for social comorbidities such as unstable housing, drug treatment, and mental health – had significantly better health outcomes than similarly needy individuals who did not receive these models of care [*CHAIN Update Reports #24 and 30*]. This report sought to answer several questions related to the medical pathways reported by CHAIN respondents: (1) What are the patterns of these systems of care? (2) Are these systems, or medical care pathways, composed of different populations? (3) What predicts a move from one pathway towards another, and do people tend to move towards a specific pathway? (4) Is there an association between being on a particular path and use of social service agencies (that is, are people on certain paths more likely to use a greater number of social service agencies compared with people on another medical care pathway)?, and (5) Are certain paths associated with better health outcomes?

### *Key Findings*

- C People tend to remain on the medical care pathway that they initiate. Over two-thirds of individuals who began on a voluntary hospital, HHC, or private doctor pathway remained on the same path throughout.
- C Individuals who moved from their pathway tended to move towards a voluntary hospital path. Very few people reported moving to an HHC or private doctor pathway.
- C There are significant socioeconomic differences among the groups on different pathways. Individuals at private doctors are far more likely to be white, MSM, more highly educated, in less impoverished neighborhoods, and to be sicker. Individuals at HHC paths are more likely to be black, over 50 years old, and more likely to live in high poverty neighborhoods. Individuals at community health centers and drug treatment centers are likely to be younger, less educated, and to be healthier than individuals on other pathways. Individuals at voluntary hospitals provide the most balanced groupings, with no one socioeconomic characteristic predominating.
- C In a head-to-head comparison, individuals on a voluntary hospital pathway are over 60% more likely to report appropriate medical care than individuals on private doctor paths, although they are less likely to report antiretroviral therapy and more likely to report social service utilization.
- C There were virtually no differences in health outcomes between individuals on a voluntary hospital pathway and those individuals on an HHC path, which suggests a fair amount of equity between these systems of care.
- C At first, paths appear to exert a significant effect on health outcomes, but in many cases this only masks fundamental population differences among the medical care pathways.

### **Introduction**

The systems of medical care in New York City have evolved over time as a consequence of market forces, professional and organizational interests, demographic shifts, and policy efforts at the federal, state, and local level. Recent marketplace forces shaping the city's health care landscape have included the merger and consolidation of hospitals seeking to create vertically integrated health systems, the promotion of community-based ambulatory clinics by hospitals seeking to expand their patient population, and the expansion of independent provider networks. The systems of care that have developed to serve an HIV+ population have been particularly influenced by policy efforts and key reimbursement and funding pools. Medicaid and Ryan White CARE Act funds have provided substantial monies for HIV/AIDS treatment. As a result, health care providers and organizations have modified or shaped their practices to be responsive to specific funding initiatives – NYS AIDS Institute Designated AIDS Centers, enhanced

Medicaid reimbursement rates for individual providers with large HIV+ caseloads, and Ryan White Title I medical care and social service contracts, to name a few. The implementation of Medicaid Managed Care Special Needs Plans for HIV+ individuals will clearly have a substantial impact as well on the health care environment, if and when they take effect.

The result of these market and policy activities is that HIV+ individuals in the city have a large number of medical providers and organizations from which to choose a primary practitioner. Individuals may be constrained in their selection by the type of health care coverage they have – whether it’s private insurance, an HMO, Medicare, Medicaid, or ADAP – but they generally have freedom to move from provider to provider.

The underlying premise of this analysis of medical care pathways is that it is possible to distinguish groups of people by the organizational settings in which an individual receives his or her HIV primary medical care. In other words, we have hypothesized that a medical care organization exerts an independent effect on a patient beyond the influence of any individual medical provider.

We also believe that it makes sense to look at these organizational settings of medical care over time, in an effort to define a pathway of medical care. We have defined the beginning of the “path” as the first organizational setting at which an individual received primary HIV medical care after his or her initial HIV diagnosis, and then followed the path as the individual’s primary medical care setting at each interview wave. For the final sets of analyses in this report, we have controlled for other factors that might be associated with the outcomes of interest or which might predict certain medical care pathways over others – sociodemographic characteristics, health status, and risk characteristics.

## **Data & Methodology**

The CHAIN data set is composed of 967 individuals recruited through a multi-stage sampling strategy and targeted sampling techniques. The baseline cohort of 700 individuals was recruited in 1994-1995 and a refresher cohort of 267 individuals was recruited in 1998. The cohort is broadly representative of the city’s estimated 80,000 HIV-positive population in care (see Table 1), with over-representation of non-Hispanic blacks and a slight under-representation of whites. The research team has conducted seven waves of interviews since the original recruitment, allowing for an interval of approximately six to twelve months between interviews. At each successive wave of interviews a small number of study participants were lost to follow-up. The research team has used a number of resources and strategies to recontact or confirm the status of individuals lost to follow-up, and occasionally an individual who has been lost to follow-up in an earlier wave is recontacted and interviewed at a subsequent wave.

**Table 1. Comparison of Epidemiological Data with CHAIN Data**

	Surviving AIDS Cases, NYC†	CHAIN: Wave 7
	Through December, 1999	2000-2001
n	43,150	444
<b>MALE</b>	32,012	238
<i>Non-Hispanic White</i>	27%	19%
<i>Non-Hispanic Black</i>	38%	54%
<i>Hispanic</i>	33%	26%
<i>Other</i>	2%	1%
<b>FEMALE</b>	11,138	206
<i>Non-Hispanic White</i>	12%	5%
<i>Non-Hispanic Black</i>	53%	66%
<i>Hispanic</i>	34%	29%
<i>Other</i>	1%	1%

† NYC DOH Office of AIDS Surveillance, "Estimates of Persons Living with AIDS in NYC, 1999 Edition"

In the two-hour long interviews, conducted in a face-to-face setting by community-based trained interviewers, participants are asked about: (1) their encounters with the health care delivery system, (2) their need for services, (3) their access, utilization and satisfaction with health and social services, (4) key sociodemographic characteristics, (5) informal caregiving from friends, family and volunteers, and (6) their quality of life with respect to health status, psychological and social functioning. A number of items have been added over the years related to antiretroviral therapies, specific medical care services, viral load levels, and other topics of interest to policymakers, planners, providers, and clients on the Title I Planning Council.

### *Measuring Agency Pathways*

In order to construct the pathway variable, two main steps were taken. First, a packed string variable was created, consisting of eight possible points of observation, which represented an individual's entry point into HIV care and the medical care providers he visited over his follow-up period, up to seven years. The first observation point referred to the first doctor an individual reported seeing after his HIV-positive diagnosis ("Who was the first doctor or medical provider you went to for your HIV infection?"). We classified medical care and social service agencies based on organizational measures (e.g., organizational type, government type, etc.), and

assigned a value of 0-5<sup>1</sup>, reflecting the doctor's "provider type" (0 = the subject did not see a doctor; 1 = HHC; 2 = voluntary hospital; 3 = CHC/clinic; 4 = drug treatment/social service; 5 = private physician). Observation points 2-8 indicated the doctor whom an individual reported as his or her "current medical provider" for interview waves 1-7, respectively. A current medical care provider is defined as "a medical person whom you feel is or was at some time in charge of your overall HIV condition" and was assigned a number on the same 0-5 scale as described above.

For example, the packed string pathway variable for an original cohort member may have looked like "11111111," indicating that the first doctor he visited after an HIV-positive diagnosis, as well as his current medical care provider in Waves 1-7, was of the HHC provider type. This individual may have changed individual providers, and may even have changed hospitals, but across all waves he has received medical care at an HHC facility. For all refresher cohort members, the packed string variable included only the first observation point and observation points 6-8, representing Waves 5-7.

Before we began defining specific medical care pathways we first sorted and examined these packed string variables to see if clusters or patterns emerged. By arranging the packed strings this way we were able to discern twelve general trends, as illustrated in Table 2. This analysis was restricted to individuals in the original baseline cohort who had a minimum of three medical care provider observations (including the potential of having had no medical provider at a point of observation). A great majority of individuals, 70%, were observed ending up at a Voluntary hospital or clinic, regardless of where they began. An additional 19% began and ended up at a HHC facility.

Based on this analysis of trends we decided to define an individual's path at each interview wave based on the history of medical care providers and which one predominated. Counting across the string variable, up to and including the wave of interest, the number of times a subject reported the same provider type as well as the number of valid observations was calculated. A "predominance ratio" measure was then calculated by dividing the count of the same provider type by the number of valid observations. Because most subjects reported utilizing more than one provider type, the following decision rules were applied to both original and refresher cohort members. If the predominance ratio was two-thirds (66%) or more, then this provider type was considered to be the dominant pathway. If a subject could not be assigned a pathway, as they did not report one provider type for at least two-thirds of their observations, then they were considered to be a "mover." Thus, a "pathway" variable was created that took

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<sup>1</sup>Due to small sample size in the CHC/clinic and drug treatment/social categories, these two categories were ultimately merged. More importantly, it conceptually made sense to merge the two categories because they were shown to serve a similar clientele. Analysis was conducted to examine the two populations, and except for drug use behavior, the two categories were not significantly different on any basic background characteristics. Thus, all variables which incorporated provider type into their construction are based on one CHC/clinic/drug treatment/social service category.

one of six values<sup>2</sup>: 0 = no current medical provider pathway; 1 = HHC pathway; 2 = voluntary hospital pathway; 3 = CHC/clinic/drug treatment pathway; 4 = private doctor pathway; 5 = “mover.”

**Table 2. General Trends in Movement Among Medical Care Provider Types**

<b>Trend</b>	<b>Percent of all individuals in analysis (n=471)</b>
Begin and remain at a Voluntary hospital	33%
Begin in HHC and move to Voluntary hospital	20%
Begin and remain at HHC	19%
Begin at Voluntary and move to Drug Rx or Private MD	10%
Begin and remain with a Private MD	8%
Begin at a Voluntary, move out, and return to Voluntary	5%
Begin and remain at a Neighborhood Health Clinic	4%
Begin at a Neighborhood Clinic and move to Voluntary	4%
Begin at Drug Rx and move to a Voluntary	4%
Begin with a Private MD and move to a Voluntary	4%
Begin and remain at Drug Rx	2%
Begin at Drug Rx, move to a Voluntary, return to Drug Rx	2%

Examples help to illustrate these rules. If by Wave 4<sup>3</sup>, a subject reported HHC medical provider type three times, a voluntary hospital once, and had one missing observation (denoted with a period) so that her string variable was “112.1,” her pathway at Wave 4 would have been HHC, as three out of her four (75%) valid observations were of a HHC provider type. If the fourth observation had not been missing, but was a voluntary hospital (11221), she would be considered a “mover” at Wave 4, as HHC and voluntary hospital were reported for only three-fifths (60%) and two-fifths (40%) of the time, respectively. If, by Wave 7, a subject reported “11221222,” she would still be considered a “mover” at Wave 5 and Wave 6, but assigned to the voluntary hospital pathway at Wave 7.

<sup>2</sup> Pathways were calculated for Waves 1-7 for originals and Waves 5-7 for refreshers. However, only pathways determined at Wave 2 on and Wave 6 on for originals and refreshers, respectively, were included in analysis based on the premise that a minimum of three observations is needed to establish a pathway. If a subject had a missing value at a given wave, he or she was not considered to be on a pathway for that wave..

<sup>3</sup> Please note that at each wave there is the possibility of wave number plus one observations. For example, at Wave 4 there is a possibility of *five* valid observations because the first observation (first doctor after HIV-positive diagnosis) was collected at Wave 1 along with the second observation.

In addition to looking at an individual's medical care pathway, we also measured the "stability" of a path. The "stability" variable is a dichotomous variable that indicates whether or not a subject's current medical provider type reported in the wave of interest matches the pathway they were assigned at the *prior* wave (0 no match; 1 match). We used the inverse of this stability measure to create a "diversion" variable that indicated whether a subject has made a change in provider type since the last time they were interviewed (0 no diversion; 1 diversion).

### *Measuring Outcomes and Other Factors*

Table 3 lists the outcome variables, three of which are scored dichotomously (that is, yes/no), and two of which are continuous numerical counts. The first outcome, "appropriate medical care," is based on a respondent's reported receipt of specific diagnostic tests (for example, a complete blood test and a complete physical exam) as well as on a minimum number of primary care visits over the prior six-month period. This is intended to measure clinical care that meets preferred practice guidelines established by the NYS AIDS Institute for HIV adult primary care. The complete algorithm can be found in Table A-1 at the end of this report.

**Table 3. Outcome variables**

<b>Indicator</b>	<b>Measurement</b>
<i>Appropriate medical care</i>	Based on number of medical care visits in prior 6 months, self-reported complete physical and blood work, and use of antiretroviral therapy. See Table A-1 at the end of the report for detailed criteria
<i>ARV</i>	On any antiretroviral therapy at time of interview
<i>In-patient Hospitalizations</i>	Any self-reported in-patient use in prior 6 mos.
<i>Social service utilization</i>	Total number of social service and ancillary service agencies reported
<i>Case management utilization</i>	Total number of case management agencies reported

The other two dichotomously coded outcome variables measure a respondent's report of any antiretroviral therapy and any inpatient hospitalization in the past 6 months.

In order to construct the continuous dependent social service variables, eleven social service categories about which the CHAIN interview collects agency data were identified: Case management, housing, professional mental health, non-professional/supportive mental health, home health care, food and nutrition, household items, financial services, legal services, transportation, and employment services. For each category, the total number of agencies from which a client reported receiving services was counted per wave. Thus, the case management dependent variable was simply the total number of case management services a client reported at a given wave. The overall social services variable was calculated by summing the number of agencies a client reported across all eleven categories.

Table 4 lists the independent variables used in the analyses. Most of the listed variables are scored dichotomously. Among those that are categorical (such as race/ethnicity, with multiple categories), a series of dummy variables were created for the purposes of the multivariate analyses. These factors may be broadly grouped as sociodemographic characteristics (gender, race/ethnicity, age, education, neighborhood poverty), health characteristics (recent OI, T-cell count, health status), and risk (drug use, HIV risk group). We have also included the interview round as a potential explanatory variable, since this accounts for historical changes over time that may occur more broadly.

**Table 4. Independent Variables**

<b>Sociodemographic characteristics</b>	
<i>Gender</i>	Respondent's self-report of gender
<i>Race/Ethnicity</i>	Black, non-Hispanic; White, non-Hispanic; Hispanic
<i>Age group</i>	Respondent's age at interview (20-34, 35-49, 50+)
<i>Educational Level</i>	Respondents report less than a high school diploma
<i>High Poverty Community</i>	Residential zip code > 40% population under federal poverty line
<b>Health characteristics</b>	
<i>T-cell count</i>	Self-reported CD4 count (<200, 201-500, >501)
<i>Opportunistic infection</i>	Reported OI in prior 6 month period
<i>Self reported physical health status</i>	Scored on MOS Physical Component Summary Scale (PCs<45.0 is low)
<i>Self reported mental health status</i>	Scored on MOS Mental Component Summary Scale (PCs<37.0 is low)
<b>Risk</b>	
<i>HIV risk behavior</i>	Self reported as MSM; MSM + IDU; IDU; Other
<i>Drug Use</i>	Self reported as current user; former user; never used
<i>Round</i>	Interview round (1-7)

## Analysis & Findings

### *Patterns of Systems of Care*

Table 5 illustrates the distribution of primary medical providers at each interview wave as characterized by their organizational setting. As this trend analysis reveals, there are few major shifts or changes from year to year. This table looks at the CHAIN cohort as a whole, rather than individual-level changes. Overall, voluntary hospital settings predominate, accounting for 41% to 52% of the cohort at any given interview wave. The overall trend suggests that reporting of voluntary facilities is on the rise. The only other organizational setting on the rise are community health centers and drug treatment facilities, which range from 15% to 21% of the CHAIN cohort at any wave. The other three organizational settings reveal declining numbers at each interview wave. CHAIN respondents reporting HHC facilities as their primary medical care setting drop from 22% to 15% by the seventh wave. Private practitioners rise from 12% at Wave 1 to 16% at Wave 4, but then decline to 8% at Wave 7. Individuals who report having no regular medical provider decline from 9% at baseline to 5% at Wave 7.

**Table 5. Medical Provider Organizational Settings, by Wave**

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7
	n=700	n=568	n=480	n=420	n=652	n=508	n=444
<i>HHC</i>	22%	22%	19%	19%	17%	16%	15%
<i>Voluntary Hospital</i>	41%	41%	48%	47%	49%	52%	51%
<i>CHC/Drug treatment</i>	15%	15%	15%	16%	20%	21%	21%
<i>Private Doctor</i>	12%	14%	14%	16%	10%	9%	8%
<i>None</i>	9%	7%	3%	3%	5%	3%	5%

Some of the trend fluctuations in this table may be caused by selective cohort attrition, rather than any individual movement among providers. In other words, it is possible that individuals lost to follow-up or who have died may have been more likely to represent one organizational setting (such as “no medical provider”), and thus changed the cross-sectional distributions. A separate analysis of intra-individual pathways (data not shown), in which an individual’s path is the accumulation of a dominant medical care provider over time, reveals similar patterns to those illustrated in Table 5. It seems likely, then, that the cross-sectional distribution represents a fair estimate of the patterns of medical care provider settings.

### *Composition of Medical Care Pathways*

The next analysis explored the composition of the client populations at each pathway. We looked at the dominant medical pathway at both wave 4 (among the original cohort only) and at wave 7 (using both the original and refresher cohort). As Table 6 illustrates, there are

substantially different populations on each path. Although these differences attenuate somewhat by Wave 7, most of the key differences persist.

The population on the HHC path is a relatively even mix of men and women, predominantly black, more likely to be over 50 years old, less likely to be MSM, and more likely to live in high poverty neighborhoods.

Individuals on the voluntary hospital path are slightly more likely to be men than women, but otherwise more evenly distributed across other characteristics.

The population reporting a community health center or drug treatment path are likely to be younger, more likely to be IDU, have less education, live in higher poverty areas, and be less sick than their counterparts on other pathways.

Individuals at private doctors represent the most striking differences with the other pathways. They are far more likely to be men, to be white, to be MSM or MSM and IDU, to be more educated, to live in low poverty neighborhoods, and to be sicker.

“Movers,” from whom no single medical care pathway predominates, are generally younger and less educated than individuals on more consistent paths.

In a bivariate chi-square analysis (data not shown), all of the above findings are borne out, in addition to several others – individuals with higher reported physical health status scores are more likely to be on a private doctor path, and are less likely to move. Individuals with lower mental health score are more likely to move from path to path or have no regular medical provider. Similarly, unstably housed individuals are also much more likely to have no regular medical provider or to move from path to path.

Fundamentally, these analyses suggest that there are substantial socioeconomic and risk differences among the dominant medical care pathways. As will be discussed in a later section examining the relationship between pathways and outcomes, these population differences play a significant part in explaining the differences.

**Table 6. Population Profiles by Dominant Medical Provider**

	At Wave 4 - 1997					At Wave 7* - 2001				
	HHC	VOL	CHC/ Drug	PMD	Mover	HHC	VOL	CHC/ Drug	PMD	Mover
	n=77	n=150	n=40	n=47	n=93	n=67	n=181	n=60	n=28	n=98
<b>Gender</b>										
<i>Men</i>	49%	60%	68%	87%	52%	51%	56%	52%	82%	44%
<i>Women</i>	51%	41%	33%	13%	48%	49%	44%	48%	18%	56%
<b>Race/Ethnicity</b>										
<i>White</i>	7%	17%	0%	61%	11%	2%	14%	7%	46%	12%
<i>Black</i>	72%	52%	62%	20%	58%	86%	57%	57%	32%	56%
<i>Latino</i>	21%	31%	39%	20%	31%	12%	29%	37%	21%	32%
<b>Age Group</b>										
<i>20-34</i>	14%	25%	33%	28%	20%	11%	13%	18%	7%	13%
<i>35-49</i>	61%	64%	58%	58%	70%	58%	61%	70%	61%	63%
<i>50+</i>	25%	11%	10%	15%	10%	31%	26%	12%	32%	24%
<b>HIV Risk Behavior</b>										
<i>MSM</i>	7%	23%	23%	64%	19%	12%	20%	8%	50%	15%
<i>IDU</i>	55%	45%	58%	0%	50%	43%	42%	45%	0%	44%
<i>MSM + IDU</i>	12%	12%	5%	21%	5%	8%	7%	8%	29%	11%
<i>Other</i>	27%	20%	15%	15%	26%	37%	31%	38%	21%	30%
<b>Education</b>										
<i>Less than HS</i>	38%	41%	65%	17%	42%	43%	48%	68%	25%	45%
<i>Greater than HS</i>	62%	59%	35%	83%	58%	57%	52%	32%	75%	55%
<b>Neighborhood</b>										
<i>High poverty</i>	29%	21%	31%	4%	23%	27%	23%	37%	11%	28%
<i>Low Poverty</i>	71%	79%	69%	96%	77%	73%	77%	63%	89%	72%
<b>T-cell</b>										
<i>&lt;200</i>	33%	28%	23%	47%	33%	12%	22%	15%	29%	31%
<i>201-500</i>	46%	51%	45%	36%	41%	46%	46%	37%	46%	38%
<i>&gt;500</i>	22%	22%	33%	17%	26%	42%	32%	48%	25%	32%

\* Note: Includes refresher cohort of 267 individuals recruited in 1997-1998

### Movement between Medical Care Pathways

We have separately analyzed two types of movement. First, as illustrated in Table 7, is the general movement trend from one predominant pathway to another. The second analysis, represented by the odds ratios in Table 8, illustrates the factors that contribute to a move or “diversion” from a path at any given interview wave. Table 7 looks at the change in pathway for the original CHAIN cohort, from their dominant path at waves 1 through 4 in comparison to their path at waves 5 through 7. As is clear from the table, there is a great deal of stability, in that the average response is for an individual to remain within the same pathway. Individuals who begin at voluntary hospitals are the likeliest to remain at voluntary hospitals (80%), whereas those who started at private doctors are less likely to remain there (64%). As noted earlier in the report, most individuals who move from a pathway end up at voluntary hospitals. Among individuals who start at HHC, 14% end up at voluntary hospitals; among individuals at neighborhood health centers or drug treatment facilities, 19% end up at voluntary facilities; 14% of those who began as private doctor paths end up at voluntary facilities; and those who had no stable path or no medical provider prior to wave 4 tend to end up at voluntary facilities (55%). In a separate analysis examining the movement of individuals who begin at voluntary hospitals (data not shown), the great majority end up in drug treatment programs rather than at neighborhood clinics.

**Table 7. Pathway Movement, Among Original CHAIN Cohort**

Dominant Medical Provider, Waves 1 - 4	Dominant Medical Pathway, Waves 5-7					
	n	HHC	Voluntary Hospital	CHC/Drug Treatment	Private Doctor	Other
<i>HHC</i>	74	74%	14%	1%	4%	7%
<i>Voluntary Hospital</i>	146	0%	80%	11%	3%	7%
<i>CHC/Drug treatment</i>	36	3%	19%	67%	6%	6%
<i>Private Doctor</i>	42	0%	14%	5%	64%	17%
<i>Other</i>	87	3%	55%	20%	7%	15%

Note: Percentages are row percentages. Also, the “other” category includes individuals who have no medical provider and those who have moved from one to another such that none predominates.

Table 8 illustrates the results of a multivariate logistic regression equation, in which different factors were compared to see which provided the greatest contribution in explaining why individuals divert from a specific path. The analysis was done as a generalized estimation equation, which allowed us to pool the repeated observations of CHAIN respondents across all the waves and then control for intra-individual bias. We ran this analysis for the cohort overall (regardless of which pathway an individual was on), and then ran separate regression equations for each pathway to determine if the factors at work in diverting from a path were specific to that pathway. All of the illustrated measures are dichotomous (i.e., “being male” versus “being female”). For each measure, the element not shown is the reference group. As an illustration to interpreting the table, one would say that among individuals on an HHC path, men were half as likely as women to divert from the path, holding all other sociodemographic, health, and risk characteristics equal.

Overall, only two factors are significantly associated with the likelihood of diverting from a pathway: individuals with low reported mental health summary scores are 30% more likely to divert from a path, and current drug users are 50% more likely to divert from a path, all other factors being equal.

There are path-specific differences evident in Table 8. Among individuals on an HHC pathway, men and people over 50 are significantly less likely to move from the path, whereas black respondents, current drug users, and MSM are significantly more likely to divert from the path. Individuals on a voluntary hospital path reveal a very different pattern. In that

**Table 8. Odds Ratios of Factors Associated with Diverting from a Pathway, by Path**

	Individuals on Any Path	Individuals on HHC Path	Individuals on Voluntary Hospital Path	Individuals on CHC/ Drug Rx Path	Individuals on Private Doctor Path
<b>Number of Individuals</b>	n=744	n=160	n=334	n=130	n=78
<b>Number of Repeated Observations</b>	n=2692	n=517	n=1101	n=341	n=285
<b>Sociodemographic Characteristics</b>					
<i>Being male</i>	0.8	0.5 †	0.7	1.5	1.0
<i>Being black</i>	1.1	5.6 †	0.5 †	2.9	1.6
<i>Being Latino</i>	1.2	5.2	0.7	2.8	1.8
<i>Being 35-49 years</i>	1.1	0.7	1.1	1.1	0.5
<i>Being 50+ years</i>	1.2	<b>0.3*</b>	1.6	1.9	2.4
<i>Living in a high poverty neighborhood</i>	1.2	0.8	1.3	0.5 †	0.4
<b>Health Characteristics</b>					
<i>Having a recent OI</i>	1.1	1.2	1.3	1.3	1.0
<i>Having a T-cell &lt;200</i>	1.2	0.7	1.1	1.0	0.8
<i>Having a low reported health status</i>	0.9	1.2	0.9	1.0	0.8
<i>Having a low reported mental health status</i>	<b>1.3*</b>	1.3	<b>0.5*</b>	1.6	1.7
<b>Risk Characteristics</b>					
<i>Being a former drug user</i>	1.2	2.4 †	1.2	1.7	1.0
<i>Being a current drug user</i>	1.5 †	<b>3.1*</b>	1.4	3.0 †	0.3 †
<i>Being a MSM</i>	1.1	<b>2.8*</b>	1.1	0.6	3.0

† p<=.10

\* p<=.05

Note: All Odds Ratios have been adjusted for all other covariates displayed in the table as well as round of interview.

organizational setting, black respondents are half as likely as non-black respondents to move, and individuals with low mental health summary scores are also half as likely to move as individuals

with higher mental health summary scores, all other factors being equal. Among individuals on community health centers and drug treatment paths, individuals living in a high poverty neighborhood are half as likely to move, whereas current drug users are 3 times as likely to move (as one would expect from an individual who completed a drug treatment program). Finally, among individuals on a private medical practitioner path, current drug users are much less likely to move from the path as are individuals who never used drugs.

### *Relationship of Medical Care Pathways and Selected Outcomes*

The final sets of analyses explore the relationship between specific pathways and selected outcome measures. We have looked at medical pathways in two ways – in one, we considered the specific paths, as we have elaborated upon throughout this report. As such, we investigated whether individuals who reported a specific medical care pathway were more likely to experience better health outcomes. The second analysis looked at the stability of an individual's pathway, regardless as to which pathway it was. The assumption underlying this analysis was that there may be a benefit that accrues to an individual who maintains continuity on a specific path, notwithstanding that this individual may switch individual providers or even hospitals, while staying within an organizational setting.

Each of these analyses was conducted as a multivariate logistic regression, using a generalized estimation equation that allowed us to pool repeated observations across waves. In Table 9 we split the regression analyses into “head-to-head” comparisons of three of the medical care pathways – voluntary versus HHC, voluntary versus private doctor, and HHC versus private doctor. This permitted us to look for where the real pathway differences lie. The most significant pathway differences existed between individuals on a voluntary hospital path and those on a private doctor pathway. Individuals on voluntary pathways were significantly more likely to report appropriate medical care than their counterparts at private doctors, regardless of their sociodemographic, health, or risk characteristics. On the other hand, individuals at voluntary hospital paths were less likely to be on antiretroviral therapy, more likely to report recent in-patient use, and more likely to report social service utilization, all other factors being equal.

The differences between the voluntary and HHC paths, both of which might be considered “institutional” paths, were negligible. The only significant difference in the unadjusted equation (in which only the pathway is correlated with the outcome, without any of the other potential explanatory factors present) was that individuals at voluntary hospitals were less likely to report social service utilization than individuals on HHC pathways. This finding disappeared, though, in the adjusted equation, which suggests that the other factors “explain away” the difference. There were a number of differences between individuals on an HHC pathway and those on the private doctor path, but almost all were explained away by other factors. The only difference that remained at the end between these two paths was that individuals on an HHC path reported 32% greater number of social service agencies than did individuals on private doctor paths.

**Table 9. Odds Ratios of Outcome Variables, by Dominant Medical Path (NYC CHAIN data, 1994-2001)**

	Voluntary vs. HHC <sup>1</sup>		Voluntary vs. Private MD		HHC vs. Private MD	
	Unadj. <sup>2</sup>	Adj. <sup>3</sup>	Unadj.	Adj.	Unadj.	Adj.
# Observations	1,646	1,619	1,411	1,388	813	803
<b>OUTCOMES</b>						
<i>Appropriate med care</i>	1.01	1.03	<b>1.65**</b>	<b>1.63*</b>	<b>1.66*</b>	1.25
<i>Antiretroviral therapy</i>	1.27	.97	<b>.61*</b>	.71	<b>.48**</b>	1.14
<i>Recent inpatient use</i>	.90	.98	<b>1.52*</b>	1.47	<b>.53*</b>	1.30
<i>Soc service utilization<sup>4</sup></i>	<b>.68*</b>	.36	<b>1.12*</b>	<b>2.20***</b>	.47	.77
<i>Case mgmt utilization</i>	-.018	.003	<b>.52***</b>	<b>.49***</b>	<b>.53***</b>	<b>.32*</b>

\* p &lt; .05

\*\* p &lt; .01

\*\*\* p &lt; .001

Notes

1. “Voluntary” refers to voluntary and not-for-profit hospitals and associated clinics, “HHC” refers to New York City Health and Hospital Corporation (public) hospitals and clinics, and “Private MD” refers to solo or group medical practices.
2. Unadjusted odds ratios describe the odds (or likelihood) of a particular outcome occurring for individuals in one category compared to individuals grouped in the comparison category. For example, individuals whose dominant medical path is at Voluntary Hospitals are 1.65 times as likely as individuals whose dominant medical path is a private doctor to meet the minimum requirements of appropriate HIV medical care. Similarly, individuals whose dominant medical path is HHC facilities are approximately half (.53) as likely as individuals whose dominant path is private doctors to report any recent inpatient use.
3. Adjusted odds ratios describe odds (or likelihoods) as described above in Note 2, in addition to controlling for other factors which might be associated with the outcome. The factors controlled for include gender, race/ethnicity, age, risk category (i.e., MSM, IDU, MSM+IDU, Heterosexual), education, high poverty neighborhood, recent opportunistic infection, tcell counts (<200, 201-500, >500), physical health status, mental health status, drug use history, and the round of the interview. For example, individuals whose dominant medical path is at Voluntary Hospitals are 1.63 times as likely as individuals whose dominant medical path is a private doctor -- all other factors being equal -- to meet the minimum requirements of appropriate HIV medical care. This significant association between medical path and outcome cannot be “explained away” by any of the other factors in the regression equation.
4. Social service utilization and case management utilization represent the total number of agencies reported by a respondent within that category. The numbers reported in the table are not odds ratios but rather correlation coefficients, which indicate a positive or negative association with the outcome variable. For example, individuals whose dominant medical path is at Voluntary Hospitals report 112% more social service visits than do individuals whose dominant medical path is a private doctor. Controlling for other potential explanatory factors, individuals whose dominant medical path is at Voluntary Hospitals report 220% more social service visits than do individuals whose dominant medical path is a private doctor

**Table 10. Odds Ratios of Outcome Variables, by Stability of Medical Path (NYC CHAIN data, 1994-2001)**

	Stable vs. Not Stable <sup>1</sup>	
	Unadj. <sup>2</sup>	Adj. <sup>3</sup>
# Observations	3,772	1,619
<b>OUTCOMES</b>		
<i>Appropriate med care</i>	<b>1.37***</b>	<b>1.40***</b>
<i>Antiretroviral therapy</i>	1.09	1.11
<i>Recent inpatient use</i>	1.12	1.20
<i>Soc service utilization</i>	-.157	-.147
<i>Case mgmt utilization <sup>4</sup></i>	<b>-.063*</b>	-.049

\* p &lt; .05

\*\* p &lt; .01

\*\*\* p &lt; .001

Notes

1. A “Stable” path is denoted as one in which the respondent reported the same dominant medical path (i.e., HHC, Voluntary, Private MD, etc) at the current round of interviewing as their historical path at the previous round of interviews.
2. Unadjusted odds ratios describe the odds (or likelihood) of a particular outcome occurring for individuals in one category compared to individuals grouped in the comparison category. For example, individuals whose medical path is stable are 1.37 times as likely as individuals whose dominant medical path is not stable to meet the minimum requirements of appropriate HIV medical care.
3. Adjusted odds ratios describe odds (or likelihoods) as described above in Note 2, in addition to controlling for other factors which might be associated with the outcome. The factors controlled for include gender, race/ethnicity, age, risk category (i.e., MSM, IDU, MSM+IDU, Heterosexual), education, high poverty neighborhood, recent opportunistic infection, tcell counts (<200, 201-500, >500), physical health status, mental health status, drug use history, and the round of the interview. For example, individuals whose medical path is stable are 1.40 times as likely as individuals whose dominant medical path is not stable to meet the minimum requirements of appropriate HIV medical care. This significant association between stability of medical path and outcome cannot be “explained away” by any of the other factors in the regression equation.
4. Social service utilization and case management utilization represent the total number of agencies reported by a respondent within that category. The numbers reported in the table are not odds ratios but rather correlation coefficients, which indicate a positive or negative association with the outcome variable. For example, individuals whose medical path is stable report six percent fewer case management agencies than do individuals whose dominant medical path is not stable.

Table 10, as did Table 9, only found one significant difference attributable to being on a stable pathway. Individuals who remained at their path were 1.4 times as likely as those who moved to report appropriate medical care.

In both of these tables, the other explanatory factors, the covariates, are actually responsible for a number of the significant differences in outcomes (data not shown). The findings include the following:

- C Older respondents are more likely to report appropriate medical care
- C Black respondents are less likely to be on antiretroviral therapy (ARV)
- C Individuals with higher t-cell counts are less likely to be on ARV
- C Over time, more individuals report being on ARV
- C Women are less likely to report recent inpatient experiences
- C Sicker individuals are more likely to report recent inpatient utilization
- C Individuals with higher physical and mental health scores are less likely to report recent inpatient utilization
- C Individuals with higher physical and mental health scores are less likely to use as many social service agencies
- C Individuals with a recent OI report greater number of case management agencies
- C Individuals with higher physical health scores report fewer case management agencies
- C Over time, people in the CHAIN cohort report fewer case management agencies

These findings make sense. Individuals who are sicker or who report lower health status (physically or mentally) are likely to have worse outcomes or utilize more health and social services. Furthermore, these findings suggest that medical care pathways can only go so far in explaining or predicting specific health outcomes. It is just as likely that what is driving the differences between pathways is the composition of the populations at those paths.

**Table A-1. Criteria for Determining Appropriate HIV Medical Care**

<b>Step</b>	<b>Criterion</b>	<b>Coded as Appropriate/Preferred Practice</b>
<b>1</b>	<b>Number of visits to primary care provider in past 6 months, Rounds 1 &amp; 2 (pre-1996)</b>	
		<i>If asymptomatic = 1 visit/6 months</i>
		<i>If symptomatic or AIDS diagnosis = 2 visits/6 months</i>
<b>2</b>	<b>Number of visits to primary care provider in past 6 months, Rounds 3, 4, 5 (post-1996)</b>	
		<i>If asymptomatic, not on antiretroviral therapy (ARV) = 1 visit/6 months</i>
		<i>If on ARV or symptomatic or AIDS diagnosis = 2 visits/6 months</i>
		<i>If CD4 count &lt; 500 and viral load &gt; 10,000 = 2 visits/6 months</i>
<b>3</b>	<b>Specific services received from primary care provider in past 6 months</b>	
		<i>Minimum of one CD4 check</i>
		<i>Respondent reported both a physical exam and a blood test/work up</i>

**Note:** Depending on time period, either steps 1 + 3 (pre-1996) or steps 2 + 3 (post-1996) have to be present to qualify for meeting preferred practice guidelines. Sources include New York State AIDS Institute "Protocols for the Primary Care of HIV/AIDS in Adults and Adolescents" (Nov 1995), the latest edition of "Criteria for the Medical Care of Adults with HIV Infection" by the AIDS Institute (Mar 1998), and personal interviews with key program staff at the AIDS Institute.