



# C.H.A.I.N REPORT

## 2007-3A

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### Pathways to Systems of HIV Medical Care

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HIV Planning Council and Public Health  
Solutions

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HRSA Contract H89 HA 0015  
October 6, 2008  
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## **ACKNOWLEDGMENTS**

A Technical Review Team (TRT) provides oversight for the CHAIN Project. TRT members who contributed to this report and revisions include Peter Messeri, PhD, Angela Aidala, PhD, and Maria Caban of Columbia University's Mailman School of Public Health; Mary Ann Chiasson, DrPH (chair), Roberta Sheinmann, Public Health Solutions; Jan Park, JoAnn Hilger, Nina Rothschild, DrPH, Clarissa Silva NYC DOHMH; Julie Lehane, PhD and Tom Petro, Westchester County DOH.

This research was supported by a grant from the NYC DOHMH as part of its Ryan White CARE Act grant, H89 HA 0015-16 from the US Health Resources and Services Administration (HRSA), HIV/AIDS Bureau with the supported of the HIV Health and Human Services Planning Council. Its contents are solely the responsibility of the report authors and do not necessarily represent the official views of the U.S. Health Resources and Services Administration, the City of New York, or Public Health Solutions.

**Introduction**

Distinct systems of HIV medical care in New York State have evolved over time as a consequence of the size and diversity of the HIV epidemic, market forces, and federal, state and local policy initiatives. Market forces have driven hospital mergers and the creation of vertically integrated health care systems in which tertiary care centers operate ambulatory networks. These entities compete with independent community health care networks and traditional solo and group practices for ambulatory patients.

Parallel with market forces that have segmented the sources of medical care, public policy has fostered the growth of a large pool of providers willing to treat HIV infected patients. The Ryan White CARE Act and the NYS AIDS Institute have supported extensive HIV professional training programs and infrastructure development. AIDS Drug Assistance Program (ADAP) and enhanced reimbursement rates through the State's Medicaid program have enabled access to appropriate HIV medical care for all HIV infected individuals regardless of economic circumstances. The result of these market forces and policy initiatives is that HIV+ individuals in New York are able to choose their medical care from a large number of primary practitioners working in a variety of organizational settings.

In an earlier CHAIN report (Update Report #36), we investigated the possibility that HIV infected individuals followed various pathways leading to distinct systems of HIV medical care. We examined whether these systems served different populations with different patterns of medical care and social service utilization and the consequences, if any, for quality of care received and patient outcomes. Report #36 found, despite the large choice a medical providers, that organizational setting (private doctor's office, hospital, community-based clinic, correctional setting) in which an individual received his or her initial HIV diagnosis was an important factor in the choice of a subsequent setting for primary medical care. This has resulted in distinct systems of HIV medical care that differ by patients' race, ethnic and class backgrounds. Over the course of 7 rounds of interviews conducted between 1994 and 2001, voluntary hospitals were the major source of care for the original NYC CHAIN cohort. Lesser numbers received care at Health and Hospital Corporation (HHC) facilities and free standing community-based clinics such as community/neighborhood health centers, medical services

based in drug treatment and supportive housing programs. Only a small percentage of CHAIN participants received medical care in office-based practices. Over two-thirds of the CHAIN cohort received their medical care in the same system of care in which they received their initial HIV diagnosis. When individuals moved between systems of care, it was typically to a voluntary hospital. The sociodemographic composition of patients also differed across systems of care. Gay, white men disproportionately received care in office-based practices. In contrast, HHC facilities and community-based clinics cared for a largely minority and medically indigent patient population. Voluntary hospitals have the most diverse patient mix of the four systems of care. Cross-system differences in service utilization and patient outcomes were associated with differences in patient characteristics rather than intrinsic differences in the quality of care across the four systems.

This report updates the earlier pathways to systems of medical care report for the period from 2001 through 2006. The analysis is expanded to include a comparison with the Tri-County region. It examines whether the sharply defined pathways from initial diagnosis into the four systems of care identified in the earlier report have persisted in more recent years. We revisit cross system comparisons of patient characteristics, service utilization and patient outcomes.

### **Key Findings**

*Consistent with earlier findings for the 1994 NYC cohort, the majority of CHAIN study participants exhibit a high level of continuity of HIV medical care within a single system of medical care.*

- ▶ The initial setting for HIV diagnosis and treatment is strongly predictive of the current system of care.
  - For the 2002 New York City Cohort, 94% of those first diagnosed with HIV at a voluntary hospital, 89% at an HHC facility, 83% at a community clinic, and 64% at a private doctor's office continued to receive subsequent HIV medical care in that same system.
  - For the Tri-County cohort, 93% of those initially diagnosed at a voluntary hospital, 96% at a community clinic, and 75% at a private doctor's office continued to receive HIV medical care in that same system
- ▶ During the period of CHAIN interviews, 2001-2006, 96% of the 2002 New York City

cohort and 93% of the Tri-County Cohort consistently received their HIV medical care within a single system of care.

*Voluntary hospitals form the dominant system of HIV medical care for CHAIN study participants.*

- ▶ Outpatient clinics and ambulatory care facilities operated by voluntary hospitals are the only or the predominant sources of HIV medical care for approximately 60% of both study cohorts.
- ▶ Most of the remaining cohort members receive their medical care at freestanding neighborhood health centers or other community-based medical clinics. For New York City residents, HHC facilities are also important sources of HIV medical care.
- ▶ Much smaller percentages of the CHAIN cohort (4% in New York City and 9% in Tri-County) consistently receive HIV medical care at a private doctor's office.

*Differences in patient characteristics are most pronounced between private practices and the other systems of care.*

- ▶ Private practice patients are better educated and are more likely to be white men who have sex with other men.
- ▶ Cohort members who have shifted their HIV medical care across systems, "movers", are less educated than those who stay within the same system of care.
- ▶ Cohort members across all systems of care are similar with respect to stage of HIV disease at time of initial diagnosis or the percentage of individuals delaying first medical visit for HIV following initial diagnosis.

*The quality of HIV medical care and medical services utilization exhibit some cross-system variation in Tri-County but not in New York City.*

- ▶ In Tri-County, voluntary hospital patients are more likely than patients in other systems to report receiving the full complement of appropriate HIV medical care services.
- ▶ In Tri-County, voluntary hospital and private practice patients are more likely than community clinic patients to be on HAART at time of interviews.
- ▶ Tri-County cohort members within the voluntary hospital system report the highest

utilization levels of all forms of medical care utilization: outpatient, inpatient and emergency room visits.

*Except for case management, Social Services utilization is similar across all systems of care.*

*Private practice patients are less likely to use case management services than CHAIN cohort members in other systems of medical care.*

*There are no systematic differences across systems of care with respect to patient outcomes.*

- ▶ There is a trend, stronger in Tri-County than in New York City, for voluntary patients to report greater adherence to HAART regimens than patients in other systems.
- ▶ Clinical markers of HIV disease progression and measures of general health are similar across systems of care.

## **Data and Methodology**

Data for this study come from the first three rounds of interviews with the 2002 New York City cohort and the first four rounds of interviews with the Tri-County cohort.

*New York City Cohort* The 2002 NYC cohort was sampled and recruited following a protocol similar to for the 1994 NYC cohort. Recruitment for the 2002 cohort was conducted between July 2002 and December 2003 at 34 randomly selected medical and social service agencies. Baseline interviews were completed with 693 individuals between August 2002 and March 2004. The gender and ethnic composition of the NYC cohort is similar to the AIDS and HIV epidemiology data with the notable exception of an under representation of white males (10% in the current CHAIN cohort compared to 25% of all living NYC AIDS cases as of June 30, 2003) and a corresponding increase in the percentage of African American and Latino males. The ethnic imbalance is similar but much less pronounced for females. The NYC cohort more closely mirrors the demographics of clients of Part A CARE Act services (8% of all Ryan White service encounters are with white clients). One possible explanation for this pattern is that disproportionate numbers of non-Latino white NYC residents living with HIV/AIDS receive medical care in private practices, venues not included in the CHAIN sampling frame. White males may also have fewer psychosocial needs than infected members of minority groups

and thus may be less likely to seek care at social service agencies where CHAIN members were recruited and CARE Act funded services are located. With respect to the focus of this study, our recruitment strategy under-represents HIV+ individuals who receive care in office based practices, which do not receive CARE Act funding.

Second round interviews conducted between March 2004 and October 2005 were completed by 549 individuals or 89% of the 615 cohort members who were alive and still residing in New York City. Third round interviews were completed with 481 individuals or 90% of 535 eligible cohort members.

*Tri-County cohort* The Tri-County cohort was recruited using methods and protocols similar to those for the New York City cohort. Recruitment for the Tri-County cohort was conducted in 28 agencies in Westchester, Rockland and Putnam Counties. Baseline surveys were completed by 396 individuals between November 2001 and November 2002. Compared to surviving AIDS cases, females were over-represented in the sample, but ethnic composition within gender closely approximated the AIDS case data. Second round interviews were completed by 315 individuals during 2003, or 91% of the 348 surviving cohort members still residing in the Tri-County region. A third round of interviews was conducted between February 2004 and May 2005 with 338 individuals that included a refresher sample of 84 individuals, interviewed for the first time. Fourth round interviews were completed with 234 individuals between the fall of 2005 and February of 2007. Completion rates for the third and fourth rounds of interviews were respectively 84% and 76%.

### *Study Variables*

*HIV Medical Care Systems.* Information on history of HIV medical care has been asked in the same way since the initial 1994 New York City baseline study. For baseline interviews, we ask for the date, place and circumstances of initial HIV diagnosis, as well as the date and place of initial HIV medical care. At each round of interview, CHAIN participants are asked whether or not there is a “medical person whom you feel is [currently] in charge of your overall HIV condition.” For the provider in charge of their HIV medical care, we obtain provider’s name and/or the name of the practice or clinic, and the street address. This information is used to link the interview data to an agency-level file that contains information describing the

organizational settings in which CHAIN participants receive HIV medical care.<sup>1</sup>

Using agency-level information, the initial medical provider of HIV care and the current medical provider at the time of each interview were classified into one of the four major systems of care: HHC facilities, voluntary hospitals, community/neighborhood health centers and other community clinic settings, and private practices.<sup>2</sup> Tri-County has no public hospital system comparable to HHC, and this category was consequently dropped from the Tri-County analysis. A small number of Tri-County cohort members are noted who were initially diagnosed with HIV at an HHC or other NYC facility. Table 1 lists the types of organizational settings that constituted each of the larger medical care systems. The 1,175 NYC and Tri-County cohort members in 3,007 interviews identified current HIV providers in 269 different organizational settings, falling into one of the four HIV medical care systems. Ten providers including Veterans Administration hospitals and facilities located outside of New York City and the Tri-County region were not included among the four systems of care. In a very high percentage of interviews (95%), CHAIN cohort members identified a current HIV provider in one of the four systems of medical care. The very small number of interviews (85) for which a current HIV provider could not be classified included 38 where the current provider was a VA hospital or located outside of the study region, 10 in which provider information was missing, and 37 where there was no current provider of HIV medical care.

Using this classification scheme, we next assigned CHAIN participants to a single system of HIV care if their current providers of HIV medical care were always from the same system of care at all rounds of interviews in which they participated.<sup>3</sup> To those who always received medical care in the same system, we added a small number of individuals whose HIV care was predominantly, but not completely, in one system of care. To be predominantly in a system of

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<sup>1</sup>A more complete description about how agency information is obtained can be found in Appendix A.

<sup>2</sup>A more detailed classification scheme was used in the initial classification of systems of care and for initial site of diagnosis and medical care. When examining entry into HIV care, we broke out as possible medical care organizational settings drug treatment programs, social service agencies, and correctional facilities.

<sup>3</sup>For individuals who reported no current HIV medical care provider at time of interview, we used the remaining interviews to determine their system of medical care.

care for the NYC cohort, an individual had to report a current HIV provider from the same system of care in two interviews and from a different system in the third interview.<sup>4</sup> For the Tri-County cohort, those predominantly in care reported current HIV care provider in the same system at two or three interviews and in a second system at only one interview. Individuals with other patterns of movement between systems (e.g. receiving HIV care in three different systems or receiving care in two systems when reporting current HIV care at only two interviews) were classified as “movers.” Eleven NYC cohort members and 19 Tri-County members were dropped from the study sample either because at one or more interviews their current HIV provider was either a VA Hospital, located outside of the two study areas, current provider information was, or they never reported a current medical provider.

**Table 1: Organizational Setting of Current HIV provider and Systems of HIV Care**

HHC Facility	Voluntary Hospital	Community-Based Care	Private Practice
-Outpatient Infectious Disease -Outpatient AIDS/HIV -Offsite Ambulatory Care -Social Services within Hospital -Diagnostic/TX Center -Home Care	-Inpatient Acute Care -Outpatient Infectious Disease -Outpatient GM/FP -Outpatient AIDS/HIV -Offsite Ambulatory Care	-Drug Treatment -CHC -Mental Health Clinic -Department of Health Clinic -AIDS Services -Social Services -Skilled Nursing Facility -Home Care -Supported Housing	-HMO -Private Multi-Specialty Clinic -Solo/Small Group practice

*Independent variables* Patient sociodemographic characteristics examined were gender, race/ethnicity, age, education, HIV risk behavior, and housing stability. For HIV risk behavior we distinguished men who have sex with men (MSM), individuals with a history of injection drug use (IDU), MSM & IDU, and all other individuals.

Indicators of quality of care and service utilization were current use of HAART, and outpatient, inpatient and emergency room visits in the six months preceding the interview. We

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<sup>4</sup>NYC cohort members who completed two interviews and were in a different system of care at each round of interview were classified as movers.

created an indication of appropriate HIV care for different stages of the disease that combines self reported outpatient visits, use of antiretroviral medications, blood test and physical examination. Appendix B to this report summarizes the specific criteria for this variable. To measure use of social services, we summed the number of the following services used in the six months preceding each interview: housing, legal, transportation, nutrition, substance abuse treatment, financial and mental health services. Case management was measured using the number of different persons who provided any form of case management in the six months preceding the interview and whether a case manager helped with referral for specific medical services (“medical case management”).

Indicators of treatment outcomes included CD4 T-cell counts, viral load levels and medication adherence. General health status was assessed based on physical and mental health status scores above and below 45 and 42, respectively. Scores below these cut points are associated with disabling physical symptoms and possible diagnosed mental illness.

## **Findings**

### *Systems of HIV Medical Care*

Table 2 displays the distribution of CHAIN cohort members with respect to the system of HIV medical care. Consistent with the experience of the 1994 NYC CHAIN cohort, the 2002 NYC cohort exhibited a high level of continuity of care within the major systems of HIV medical care defined for this report. For 82% of this cohort, current HIV medical providers were from the same system, and for another 14%, current providers came predominantly from a single system. Voluntary hospitals continue to be the dominant source of HIV care in New York City; 61% of the 2002 Cohort received their HIV medical care within this system. A smaller but still substantial number of the NYC cohort received continuing HIV medical care from community health clinics (17%) or HHC facilities (14%). Very few respondents received HIV care from providers in private practice (4%), and similar numbers of individuals (4%) moved between systems of care. When compared to the distribution of organizational settings of HIV providers for the 1994 cohort, the predominance of the voluntary hospital systems as a source of HIV medical care has increased in recent years.

### **Table 2: Systems of HIV Care for NYC and Tri-County**

<b>Systems</b>	<b>NYC (over 3 rounds)</b>	<b>Tri-County (over 4 rounds)</b>
	<b>n=674</b>	<b>n=463</b>
<b>Health and Hospitals Corp. (HHC)</b>		
<i>HHC Only</i>	12%	n/a
<i>Predominately HHC</i>	2%	n/a
<b>Voluntary Hospital (VOL)</b>		
<i>Voluntary Hospital Only</i>	54%	54%
<i>Predominately Voluntary Hospital</i>	7%	3%
<b>CHC/Drug Treatment/Social Services</b>		
<i>CHC/Drug Tx/Social Service Only</i>	14%	27%
<i>Predominately CHC/Drug Tx/Social</i>	3%	2%
<b>Private Medical Doctor (PMD)</b>		
<i>Private MD Only</i>	2%	8%
<i>Predominately Private MD</i>	2%	1%
<b>Movers</b>	4%	3%

Because the study period includes only three rounds of interviews, and some individuals were interviewed once, it is possible that these data understate movement between systems of care. To examine more directly possible patient movement between medical systems, we inspected the pattern of individual change in HIV medical providers for individuals interviewed two or more times. NYC cohort members generally retain the same HIV provider over the study period. When the sample is restricted to CHAIN participants interviewed more than once, the percentage of those in the mover category increases only slightly, from just under 4% to 4.4%. Among NYC cohort members interviewed multiple times, the majority or 59% saw the same provider across all interviews. When NYC cohort members changed their current medical providers, which they did 269 times, half of these changes crossed medical care systems. The general tendency was to shift to a provider based in a voluntary hospital. Just under 40% of the inter-system shifts were to voluntary hospitals and another 32% were shifts to providers in community-based settings.

A similar pattern of the dominance of voluntary hospitals coupled with strong continuity of care within systems of HIV medical care emerged for the Tri-County region. Just shy of 60% of

the Tri-County cohort consistently received HIV care from voluntary hospitals and another 29% from community health centers and other community based organizations. Nine percent of the Tri-County cohort received care in private practice settings. Tri-County residents were even less likely than their NYC counterparts to change providers. When the Tri-County cohort is restricted to study participants with multiple interviews, the percent of movers increases from 3% to 4%. Among those with repeated interviews, 66% reported the same HIV medical provider at all interviews. The Tri-County cohort changed providers 133 times and 41% of these changes were across systems: 23 changes were into voluntary hospitals, 18 into community clinics, and 13 were to private practices.

In short, for both the NYC and Tri-County cohorts, there is a high level of continuity in current HIV medical provider that results in the observed high level of stability within systems of care. We next examine the extent to which place of initial HIV testing determines pathways into different systems of care.

#### *Pathways into Systems of HIV Medical Care*

Table 3 summarizes the organizational settings in which cohort members first tested positive for HIV infection and received initial treatment. Table 4 summarizes the most common pathways CHAIN cohort members followed from the setting for initial HIV medical care to the current system of care. Similar to the patterns for current HIV provider, voluntary hospitals (combined with the Designated AIDS Center category) are the predominant sites for initial diagnosis and treatment of HIV for both the New York City and Tri-County cohorts (Table 3). The data do indicate that community settings play a larger role in testing than treatment. A greater percentage of the New York City cohort was initially detected in community settings--community/neighborhood health centers, social service agencies and drug treatment programs--than in voluntary hospitals, 33% to 5%, but hospital-based testing increases when the 14% tested at HHC facilities is taken into account. For Tri-County, 33% of the cohort first tested positive in community settings compared to 36% testing positive in voluntary hospitals. It is noteworthy that in New York City, 11% of the cohort was initially diagnosed as inmates at a correctional facility.

#### **Table 3: Setting of Positive HIV Test and Initial Medical Care for NYC and Tri-County**

Organization Setting	NYC		Tri-County	
	Test Site	Med. Care	Test Site	Med. Care
	<b>n=684</b>	<b>n=679</b>	<b>n=419</b>	<b>n=462</b>
<i>HHC</i>	14%	20%	3%	3%
<i>Voluntary Hospital (VOL)</i>	5%	5%	36%	44%
<i>CHC/Clinic</i>	21%	12%	24%	25%
<i>Private MD (PMD)</i>	8%	6%	10%	13%
<i>Designated AIDS Center</i>	23%	40%	5%	5%
<i>Social Service Agency</i>	6%	2%	7%	2%
<i>Drug Treatment</i>	6%	5%	2%	0%
<i>Correctional</i>	11%	5%	6%	4%
<i>Out of Area Hospital or Clinic</i>	7%	5%	7%	4%

The setting of initial diagnosis was strongly predictive of current system of HIV medical care. For the New York City cohort, 94% of those first diagnosed with HIV at a voluntary hospital, 89% diagnosed at an HHC facility, 83% tested in community settings and 64% diagnosed in a doctor's private office received their subsequent HIV care in the system of medical care of initial diagnosis. For the Tri-County cohort, 93% of those initially diagnosed at a voluntary hospital, 96% in a community clinic, and 75% in a private doctor's office continued HIV care in the system of medical care of initial diagnosis.

Table 4 lists the most frequent pathways from initial to current system of medical care followed by more than 3% of each cohort. For both New York City and Tri-County, beginning and remaining in the voluntary hospital system was, by far, the most common pathway. Beginning and remaining in other systems of care also occurred frequently. Movement from other systems to the voluntary hospitals was also common. In New York City, 23% of the cohort began their care in one system and ultimately shifted to a voluntary hospital. In Tri-County 12% of the cohort shifted their care to a voluntary hospital.

**Table 4: Major Pathways from initial medical care to current systems of care**

<b>Pathway</b>	<b>Percent of all NYC cohort (N=647)*</b>
<i>Begin and remain in Voluntary Hospital</i>	37%
<i>Begin and remain in HHC Facility</i>	11%
<i>Begin in HHC and move to Voluntary Hospital</i>	6%
<i>Begin and remain in Community Clinic/Services</i>	6%
<i>Begin in Community Clinic/Services and move to Voluntary Hospital</i>	6%
<i>Begin in Voluntary Hospital and move to Community Clinic/Services</i>	5%
<i>Begin with Private MD and move to Voluntary Hospital</i>	4%
<i>Begin in Corrections and move to Voluntary Hospital</i>	4%
<i>Begin at Drug Tx and move to Voluntary Hospital</i>	3%

<b>Pathway</b>	<b>Percent of all Tri-County cohort (N=445)</b>
<i>Begin and remain in Voluntary Hospital</i>	42%
<i>Begin and remain in Community Clinic/Services</i>	22%
<i>Begin and remain in private MD's</i>	6%
<i>Begin in Voluntary Hospital and move to Community Clinic/Services</i>	5%
<i>Begin in Community Clinic/Services and move to Voluntary Hospital</i>	5%
<i>Begin with Private MD and move to Voluntary Hospital</i>	4%
<i>Begin in Corrections and move to Voluntary Hospital</i>	3%

\*Percentages do not add up to 100%. Pathways with less than 3% of the cohort are not reported

### *Systems of HIV Medical Care and Patient Characteristics*

We now examine the sociodemographic characteristics of patients treated in each system of care that may have a bearing on cross-system differences in demands for health services and patient outcomes. Table 5 illustrates that patient demographics do differ across systems of care. The differences are most pronounced for the small number of individuals receiving care in private practices. As expected, private practice patients tend to be of higher socioeconomic status. They

### **Table 5: Patient Characteristics by Systems of HIV Medical Care**

	NYC					Tri-County			
	HHC	VOL	CHC	PMD	Mover	VOL	CHC	PMD	Mover
	n=98	n=414	n=110	n=27	n=25	n=264	n=142	n=44	n=13
<b>Gender</b>	<i>p</i> =.20*					<i>p</i> =.33			
Men	55%	61%	54%	67%	76%	50%	49%	59%	31%
Women	45%	39%	46%	33%	24%	50%	51%	41%	69%
<b>Race/Ethnicity</b>	<i>p</i> =.048					<i>p</i> =.000			
White & other	7%	11%	6%	30%	16%	19%	22%	64%	15%
Black	57%	50%	55%	41%	56%	52%	51%	20%	46%
Latino	36%	39%	39%	30%	28%	29%	27%	16%	39%
<b>Age Group</b>	<i>p</i> =.544					<i>p</i> =.154			
20-34	8%	7%	7%	4%	4%	10%	15%	2%	23%
35-49	59%	56%	57%	63%	80%	59%	58%	59%	62%
50+	33%	37%	36%	33%	16%	31%	27%	39%	15%
<b>HIV Risk Behavior</b>	<i>p</i> =.572					<i>p</i> =.046			
MSM	16%	19%	16%	33%	28%	12%	15%	27%	15%
IDU	44%	42%	44%	30%	28%	46%	35%	41%	15%
MSM + IDU	8%	8%	8%	15%	12%	3%	5%	5%	8%
Other	32%	31%	32%	12%	32%	39%	45%	27%	62%
<b>Education</b>	<i>p</i> =.007					<i>p</i> =.000			
Less than HS	39%	39%	47%	22%	68%	38%	43%	9%	54%
Greater than HS	61%	61%	53%	78%	31%	62%	57%	91%	46%

	NYC					Tri-County			
	HHC	VOL	CHC	PMD	Mover	VOL	CHC	PMD	Mover
<b>Housing Stability</b>	<i>p</i> = .017					<i>p</i> = .150			
<i>Stable</i>	78%	80%	75%	73%	66%	87%	88%	91%	86%
<i>Double</i>	6%	6%	6%	2%	6%	6%	7%	8%	11%
<i>Unstable</i>	16%	14%	19%	25%	28%	7%	5%	1%	3%

\*p values are the levels of statistical significance is for test of independence between systems of care and each patient attribute.

are more likely to be better educated, white, and MSM than patients receiving care in the three other systems. Patient characteristics are much more similar in the three remaining systems of care. “Movers,” individuals for whom no single system of care predominates, are less educated than individuals who remain in a single system of care. These demographic differences are sharper in Tri-County than in NYC. This regional difference may reflect the much higher proportion of whites in the Tri-County (20%) than in the NYC cohort (9%). The higher socioeconomic standing of private practice patients is also consistent with findings for the original NYC cohort.

Given the strong continuity between initial source of care and current system of care, we checked for possible differences at time of initial diagnosis that might have lingering consequences for medical treatment. We found no differences between systems regarding patient conditions at time of diagnosis, at least as measured by the proportion of individuals who waited more than 4 months between the initial diagnosis and first medical visit for HIV (roughly one-quarter of each cohort) or by the proportion recalling any health problem at time of HIV diagnosis (half of each cohort).

*Systems of HIV Medical Care and Service Utilization.*

Table 6 presents system differences in patient utilization of social and medical services. For the NYC cohort, the utilization of social services was similar across systems of care. Case management is one possible area of system-level differences. Private practice patients were less likely than individuals in other systems of care to receive help for referrals for medical services (medical case management) and were less likely to receive any form of case management. The

**Table 6: Use of Social Services and Medical Care by Systems of HIV Medical Care**

	NYC					Tri-County			
	HHC	VOL	CHC	PMD	Mover	VOL	CHC	PMD	Mover
	n=98	n=414	n=110	n=27	n=25	n=264	n=142	n=44	n=13
<b>Number of Social Services Used</b>	<i>p=.117 *</i>					<i>p=.360</i>			
None	44%	44%	41%	33%	44%	44%	46%	41%	42%
One	28%	31%	29%	33%	18%	27%	27%	19%	26%
Two	15%	15%	19%	23%	18%	12%	11%	11%	10%
Three or more	13%	10%	11%	10%	20%	17%	16%	29%	23%
<b>Received Medical Case Management</b>	<i>p=.018</i>					<i>p=.000</i>			
Yes	32%	28%	34%	18%	39%	33%	40%	16%	30%
No	68%	72%	66%	82%	61%	67%	60%	84%	70%
<b>Number of Case Managers in Last 6 Months</b>	<i>p=.131</i>					<i>p=.000</i>			
None	22%	26%	20%	32%	18%	29%	23%	48%	30%
One	47%	44%	45%	45%	57%	41%	52%	36%	38%
Two	19%	21%	24%	18%	21%	19%	19%	10%	24%
Three or More	12%	9%	12%	5%	3%	11%	6%	6%	8%
<b>Receives Appropriate HIV Care</b>	<i>p=.017</i>					<i>p=.000</i>			
No	22%	24%	29%	25%	41%	21%	30%	38%	41%
Yes	78%	76%	71%	75%	59%	79%	70%	62%	59%
<b>Currently Using HAART</b>	<i>p=.048</i>					<i>p=.000</i>			
No	28%	35%	34%	28%	46%	32%	42%	24%	46%
Yes	72%	65%	66%	72%	54%	68%	58%	76%	54%
<b>Outpatient Visits in Last 6 months</b>	<i>p=.204</i>					<i>p=.000</i>			
Zero	3%	2%	4%	5%	7%	1%	4%	1%	3%
One to Three	49%	55%	53%	60%	52%	42%	54%	64%	65%
Four to Six	37%	32%	29%	22%	36%	41%	29%	23%	22%
Seven or more	11%	11%	14%	13%	5%	16%	13%	12%	11%

	NYC					Tri-County			
	HHC	VOL	CHC	PMD	Mover	VOL	CHC	PMD	Mover
<b>Inpatient Visits in Last 6 months</b>	<i>p=.112</i>					<i>p=.037</i>			
<i>No</i>	74%	80%	82%	77%	74%	78%	80%	84%	95%
<i>Yes</i>	26%	20%	18%	23%	26%	22%	20%	16%	5%
<b>ER Visits in Last 6 Months</b>	<i>p=.413</i>					<i>p=.047</i>			
<i>No</i>	62%	67%	70%	68%	67%	63%	69%	71%	76%
<i>Yes</i>	38%	33%	30%	32%	33%	37%	31%	29%	24%

\*p values are the levels of statistical significance for test of independence between systems of care and each service measure

quality and use of medical services was similar across systems of medical care, although individuals who moved between systems of care were less likely than those staying within a single system of care to receive appropriate HIV medical care or use HAART. An examination of trends in services utilization across rounds of interviews, not reported here, generally shows no systematic trends across rounds of interviews. One exception was a sharp increase in the percentage of HHC patients receiving appropriate HIV care, from 68% at baseline interviews to 84% and 85% at the second and third rounds of interviews. In contrast the percentage of individuals receiving appropriate HIV medical services declined significantly among NYC cohort members, who moved between systems of care, from 72% at baseline to 55% and 43% at the second and third rounds of interviews.

Turning to Tri-County, the pattern of inter-system differences in use of social services is similar to New York City in so far as private practice patients used fewer case management services than individuals in other systems of care. In contrast to New York City, medical service utilization did differ across systems but not in an easily summarized pattern. On the one hand, voluntary hospital patients are more likely than community clinic and private practice patients to receive care that meets standards for appropriate HIV care. On the other hand, voluntary hospital patients' HAART use is midway between the higher frequency for private practice patients and the lower level for community clinic patients. Further analysis indicates that for private practice, but not the community clinic patients, the difference in HAART use is associated with differences in patient

characteristics served by each system. Compared to cohort members from other medical care systems, patients of Tri-County voluntary hospitals consistently report highest utilization level for all types of medical services: 4 or more outpatient visits in a six month period, ER visit and inpatient care. Movers appear less engaged in medical care than individuals who stay in the same system of care. Use of HAART and receiving appropriate HIV care is relatively low among Tri-County cohort members who move between systems of care receive when compared to individuals stay in a single system of care. However, movers are also less likely than individuals staying within a single system of care to visit an emergency room or have an inpatient stay.

### *Systems of HIV Medical Care and Patient Outcomes*

The analysis in Table 7 compares patient outcomes across systems of care. Comparison of patient outcomes are best understood to assess relative severity of disease burden in each system rather than a measure of treatment effectiveness. Whichever interpretation one chooses, patient outcomes across systems are very similar. The only distinctive pattern for NYC participants is that patients at HHC facilities are less adherent to HAART regimens than are patients in other systems. Individuals who move between systems are possibly in poorer health than individuals in stable systems. Disproportionate numbers of “Movers” have CD4 T-Cell counts below 200, a higher proportion have detectable viral load levels and are more likely to fall into the low mental health status category than individuals who remain in a single system of care.

Similar to New York City, Tri-County patient outcomes exhibit minimal variation across systems of care. The only variation of note is the greater than average proportion of medication-adherent voluntary hospital patients, and the lower than average proportion of adherent individuals among those who move between systems. As in NYC, the mover category in Tri-County “movers” is associated with higher viral load counts and lower mental health status. Unlike New York City, T-Cell counts of Tri-County movers have above average T-Cell counts.

**Table 7: Health Outcomes by Systems of HIV Medical Care**

	NYC					Tri-County			
	HHC	VOL	CHC	PMD	Mover	VOL	CHC	PMD	Mover
	n=98	n=414	n=110	n=27	n=25	n=264	n=142	n=44	n=13
<b>T-Cell Count</b>	<i>p</i> =.000*					<i>p</i> =.085			
<200	16%	22%	21%	18%	43%	21%	16%	24%	14%
201-500	49%	47%	40%	50%	26%	48%	48%	38%	43%
>500	35%	31%	38%	32%	31%	31%	36%	38%	43%
<b>Viral Load Level</b>	<i>p</i> =.126					<i>p</i> =.009			
Bad: 10,000+	19%	18%	18%	26%	34%	21%	14%	21%	27%
400-9,999	21%	22%	22%	12%	17%	25%	26%	13%	14%
Good: <400	60%	60%	60%	62%	49%	54%	60%	66%	59%
<b>Physical Health Status</b>	<i>p</i> =.916					<i>p</i> =.315			
Low (<45)	56%	56%	54%	52%	56%	58%	53%	53%	49%
Higher (45+)	44%	44%	46%	48%	44%	42%	47%	47%	51%
<b>Mental Health Status</b>	<i>p</i> =.100					<i>p</i> =.358			
Low (<42)	48%	47%	42%	52%	61%	51%	50%	49%	65%
Higher (42+)	52%	53%	58%	48%	39%	49%	50%	51%	35%
<b>Adherence</b>	<i>p</i> =.050					<i>p</i> =.031			
Not completely Adherent	40%	28%	32%	31%	32%	30%	39%	39%	46%
Completely Adherent	60%	72%	68%	69%	68%	70%	61%	61%	54%

\*p values are the levels of statistical significance for test of independence between systems of care and each patient outcome.

Finally, we examined satisfaction with medical provider. As Table 8 shows, satisfaction with medical provider was very high across all systems of care, although movement between systems of care was associated with lower satisfaction in both NYC and Tri-County.

**Table 8: Satisfaction with Primary Medical Provider**

	NYC					Tri-County			
	HHC	VOL	CHC	PMD	Mover	VOL	CHC	PMD	Mover
	n=98	n=414	n=110	n=27	n=25	n=264	n=142	n=44	n=13
<b>Satisfaction</b>	<i>p</i> =.058*					<i>p</i> =.007			
<i>Very Satisfied</i>	87%	80%	84%	83%	70%	87%	82%	80%	67%
<i>Somewhat Satisfied</i>	9%	14%	13%	14%	18%	8%	13%	14%	22%
<i>Dissatisfied</i>	4%	6%	3%	3%	12%	5%	5%	6%	11%

\* p values are the Levels of statistical significance for test of independence between systems of care and each service measure

## Discussion

The findings in this paper replicate results from the earlier analysis of pathways into medical care for the 1994 NYC CHAIN cohort for both the 2002 NYC and the Tri-County cohorts. Cohort members exhibit stable pathways and continuities within larger medical care systems defined for this study. The stability within systems of care undoubtedly is in large measure due to high levels of continuity during the study period with a single medical care provider. The choice of systems partly reflects the stratification of medical care in the larger society. U.S. citizens in higher socioeconomic positions prefer to receive ambulatory care in private practice or perhaps more accurately avoid community clinics or hospital outpatient clinics. Therefore, it is notable that voluntary hospitals are the predominant source of ambulatory care for both Tri-County and New York City CHAIN cohorts. However a substantial amount of HIV care is provided in community clinic settings and in HHC facilities in New York City. The low level of private practice care is partly an artifact of the CHAIN sampling strategy, which does not include private practices as recruitment sites, but it may also reflect that primary practices may not be the optimal setting for managing complicated HIV regimens.

The second major finding is the small number and modest size of cross-system differences in service utilization and patient outcomes. The system-level differences that were present were more evident in Tri-County than in New York City. Tri-County voluntary hospital patients compared with cohort members in other systems of care were more frequent users of medical services, they possibly receive better HIV care, and had a higher level of medication adherence. Despite these

advantages, health status measures are similar across systems of care.

Study findings also suggest that the small number of people who move between systems tend to be less connected to medical care and have poorer health comes. Such findings may be an indication that movers receive services of inferior quality or are less engaged in medical care, but it is also may indicate that movers are seeking new providers because they are dissatisfied with their current source of care. The analysis for this study did not allow us to test which of these two explanations was a better fit to the data.

It is possible that differences in patient characteristics across systems of care may have obscured or overstated system differences. However, this does not seem to be the case. A multiple regression analysis that accounted for differences in patient characteristics reported in tble 5, resulted in very minimal changes in the system differences reported in this study. There are other limitations to this study. The outcomes are limited to self reported information and more detailed data on clinical outcomes might produce different results. For example, the study did not look at possible variation in length of survival across systems of care. Because of the under-representation of patients in private care, the analysis may have missed a sector of the health care system where patient outcomes may differ. The minimal differences across systems of care may mask what may be more substantial differences between different facilities within each system of care.

The absence of a consistent pattern of inter-system differences and the modest size of differences when present is not without positive implications. While HIV medical care for most CHAIN participants is confined to a single system, it is apparent that one system of medical care is not consistently superior or inferior to another system of care. Service utilization and patient outcomes are at best weakly linked to the broad systems of care in which HIV medical care is embedded. This rough parity of care and outcomes stands in contrast to the conventional wisdom that, as a general rule, medical care in office practices and private hospitals is better resourced and therefore of superior quality to that delivered in a clinic or public hospital. This study thus offers some evidence that two decades of professional training combined with infrastructure support through public health policy initiatives is succeeding in its mission to bring HIV care of uniformly high quality to all individuals, regardless of economic circumstances, in the places were they typically seek medical care.



**Appendix A: Agency Coding Procedure.**

For each agency identified by a CHAIN participant, the following process is followed to maintain an unduplicated record for every agency and units within agency. The agency-level file is constantly updated as CHAIN participants report new organizational settings. CHAIN staff check completed interviews to determine if each reported medical provider refers to a new organizational setting or one already listed in the agency file. If the organizational setting is listed in the agency database, the current HIV medical care provider is assigned an “agency” identification number that corresponds to a matching record in the database. If the provider information indicates a new organizational setting, the provider is assigned a new agency identification and a corresponding record is added to the agency file. In addition to the agency ID, each agency record includes the street address and a unique descriptive name for the organizational setting. Typically this name may list a parent entity, such as hospital or health care system, and the specific organizational setting, which may be a satellite location, department, service unit, clinic, program or possibly a provider name in the case of a solo or small group practice. Physician and organizational names reported by CHAIN participants are checked against the AMA listing of physicians and other public directories to verify the respondent’s information and inform agency code assignment. Most relevant to this study, each listing is assigned to one of 59 organizational setting codes. These codes are grouped according to units within hospitals, types of ambulatory health organizations, social service agencies and community organizations. A separate government sector code indicates whether the organizational setting is a Health and Hospitals Corporation (HHC) facility, other city, state or federal agency, a private office, or nonprofit organization.

**Appendix.B:****Criteria for Determining Appropriate HIV Medical Care**

<b>Step</b>	<b>Criterion</b>	<b>Coded as Appropriate/Preferred Practice</b>
	<b>Number of visits to primary care provider in past 6 months</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>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:** Sources include New York State AIDS Institute “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.