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Comprehensive Care Models

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C.H.A.I.N. REPORT

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Introduction

For almost a quarter century, people living with HIV/AIDS and their advocates have engaged in a grand field experiment to create new possibilities for humane and effective medical care. The creative impulse behind these practical efforts has been a continuing commitment to a comprehensive vision of HIV care. Comprehensiveness has been applied in many ways to describe the organization of HIV care. The term has been applied narrowly to the coordination of various medical care specialties managing the health sequella of HIV infection. Comprehensive as in the "C" in Ryan White CARE Act refers broadly to the full continuum of HIV health and social services for an entire city or EMA. This report focuses on a middle ground formulation: connecting medical care with ancillary and supportive services either within a single organizational setting or within a small network of agencies. For the purposes of this report comprehensive care is defined as a basket of services that are linked together through active organizational efforts to facilitate patient/client access to these services. Organizational strategies that might promote closer cooperation among service providers may include, but are not restricted to, various forms of inter-agency written agreement, formation of interdisciplinary teams, data sharing agreements, cross training and efforts at either or both geographic or administrative consolidation of the source of services (e.g. co-location). In contrast to these approaches, which attempt to promote better systems integration, case management and its variants such as case conferencing represent a client centered approach. This approach works directly with clients and helps them navigate through a complex and fragmentary service system. Actual comprehensive care models typically combine both client-centered and systems integration approaches or care coordination.

Comprehensive care is a compelling concept, at least in theory (Messeri, Kim and Whetten 2003; DHHS 2003). Many HIV infected individuals are beset by multiple social and physical problems. If those co-morbidities go unattended, they may undercut the delivery of effective medical care. Use of these services may be impeded less by limited supply than by provider ignorance about the availability of such services, conflicting eligibility requirements, excessive client time and effort to find and enroll in such services. A further impetus for comprehensive care is a commitment to reducing disparities in both access to care and medical outcomes linked to the culture, race/ethnicity, sexual diversity of people living with HIV that is frequently coupled with expressed concerns about economic and gender inequities.

Despite its intuitive appeal, there is very little if any empirical evidence to assist in the planning and evaluation of optimal forms of comprehensive care. That there is very little evidence demonstrating the value of comprehensive care is not to say that it doesn't work. A fundamental difficulty for empirical study is the problem of measuring comprehensiveness. An almost limitless variety of comprehensive care models is conceivable. It is not at all obvious how to identify, classify and measure such models. Thus before we can ask whether comprehensive care benefits clients, we must first devise valid and reliable methodology to measure consistently variation in whatever is meant by comprehensiveness. In this report we present a novel, empirically based approach for discovering variation in medical-centered comprehensive care. We then investigate whether application of this methodology results in

groupings of medical care sites into levels of "comprehensiveness" that are associated with differences in medical and social service outcomes of CHAIN participants.

Key Findings

- Forty-two medical care agencies that account for 75 percent of all HIV medical care encounters of CHAIN participants were classified into three groupings that correspond to minimum, moderate and maximum levels of comprehensive care as indexed by either onsite or linked care arrangements for four ancillary services: housing, mental health, substance abuse and case management services.

- The use of CHAIN participant reports of service utilization resulted in identification of co-located services that was in reasonably good agreement with similar information independently obtained from informants from 12 medical care sites included in the study classification scheme.

- There was much lower agreement between CHAIN data and informant reports regarding formal linked care arrangements for the focal services between the medical care sites and off-site agencies. Informants from medical care sites underscored that minimal effort was devoted to development and cultivation of formal referral agreements with outside agencies.

- The CHAIN data, confirmed by informant interviews, indicate that case management and mental health services are frequently co-located with medical care. Following study methodology, case management was judged to be co-located at 35 of 42 classified medical sites; mental health services were co-located at 36 of the medical care sites.

- Consistent with our classification scheme, use of "in network" services was positively associated with level of comprehensive care. Among CHAIN participants receiving medical care at sites placed in the maximum comprehensive care level, 69 percent of all ancillary services used were obtained "in network." The corresponding percentages for CHAIN participants receiving medical care at sites placed in the moderate and minimal comprehensive care levels was respectively, 64% and 45%.

- Contrary to initial expectations, higher levels of comprehensive care, as measured in this study, were not consistently associated with either lower levels of unmet service needs or better medical care outcomes.

- The null findings do not mean that comprehensive care is not a desirable objective for planning HIV services, but it underscores the limited evidence base for identifying comprehensive care models that work.

A Strategy to Search for Comprehensive Care Models

The CHAIN project does not collect information that would allow us to identify directly comprehensive medical care models. Instead we have devised an exploratory data analysis procedure, in which CHAIN participants' patterns of service utilization were used to discover *possible* sites where comprehensive care may be present. Figure 1 may help to fix the idea of what we are looking for. It depicts a small number of possible comprehensive care models that link medical care to some combination of ancillary services that are either located on or offsite.

The discovery process is guided by two working assumptions. First we limited our search to models that link medical care to a fixed basket of ancillary services. These services are case management, mental health, substance abuse treatment, and housing. We decided to look for medical-centered models of comprehensive care because of the current importance of a chronic disease management approach to HIV care. We selected services that have been shown in prior research to be associated with promoting entry and retention into medical care and were widely used by CHAIN participants (Messeri, Abramson, Aidala, Lee & Lee 2002).

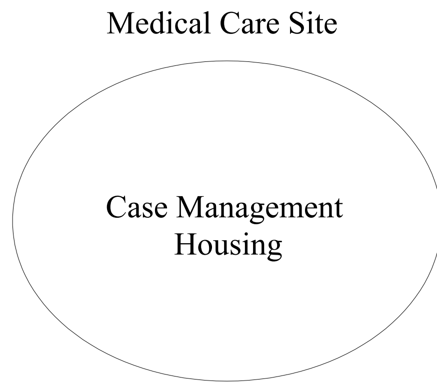
Our second working assumption is that tell tale markers for the presence of comprehensive as previously define include reports by many patients that they receive ancillary services at the same organization where they receive their medical care or that many patients from the same medical care provider also receive their ancillary services from a small network of agencies. In particular, if ancillary services are co-located with medical care, it would be reasonable to expect that a nontrivial number of patients would report receiving their ancillary services at this site. Following similar reasoning, if formal referral agreements were in effect between a medical care site and other agencies for one or more ancillary services, such arrangements would result in a number of patients receiving services at these linked agencies well in excess of what be expected by chance connections. Therefore the number of CHAIN participants who pair different organizations where medical care and ancillary services are provided as evidence for a identifying possible linked-care arrangement between two agencies.

It must be emphasized that service utilization patterns are not an ideal data source for detecting comprehensive care models. The more patients who report going to the same organizations for medical care ancillary services onsite or who report going to a small number of "offsite" agencies, increases but cannot conclusively demonstrate the likely existence of intentional comprehensive care models. Such clustering might occur by chance or the result of informal interactions between agency staff and their clients. Nonetheless, searching for dense patterns of multiple service utilization within a single agency and between pairs of agencies may be a good first step for identifying the existence of possible comprehensive care models. The absence of patient counts for either co-located or offsite services is not conclusive evidence for the absence of formal arrangements linking two agencies together.

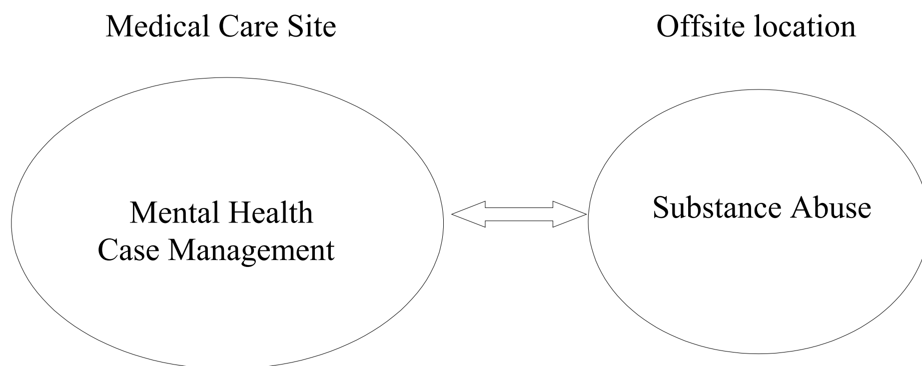
To search for patterns of CHAIN participant service utilization consistent with possible comprehensive care models, we pooled nine rounds of CHAIN data collection (eight rounds of

Figure 1: Hypothetical Comprehensive Care Models

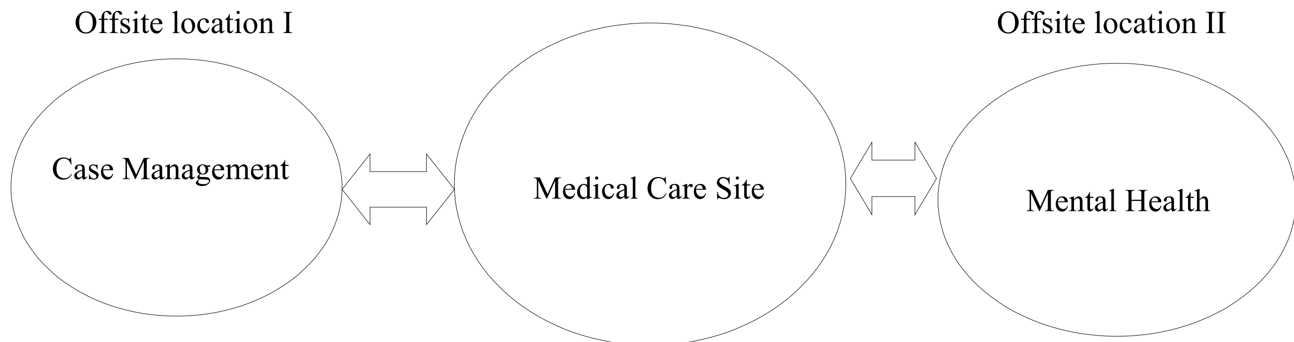
Pure Co-Location



Co-Location and Linked care



Pure Linked Care Arrangement



interviews with the original cohort and the baseline interview for the new cohort). We retrieved from the data set, (1) each participant's unique ID, (2) the interview round, (3) reported use of medical, case management, housing, mental health, and alcohol and drug treatment services, and (4) the ID's of the agencies providing each of these services. Use of services was determined following standard definitions used in previous CHAIN reports. Definitions of use of ancillary services, service needs, unmet service needs and other study variables are summarized in Table 1. Table 2 illustrates how service location data were organized into a data set. At each round of interviews, CHAIN participants could generate up to four records that linked contemporaneous source of medical care with one to four ancillary services (case management, housing, substance abuse and mental health). When the data are organized in this way, it is easy to count, across all nine rounds of interviews, the number of records or instances in a medical care site is reported both for medical care and as a source for an ancillary services. We also used this data set to generate pairings of medical care sites to sites that reported as sources for one or more ancillary services. We counted the number of different participants at different rounds of interviews reported each pairing.

For purposes of searching for comprehensive care models, the search procedure was limited to 42 medical care agencies for which there were a minimum of 10 separate observations in the study data set. Medical care agencies with fewer than 10 observations were judged too few to draw reliable inferences for discriminating between the presence or absence of either co-located or linked care arrangements. To reduce erroneous instances of co-location either from faulty recall or a short lived service, an ancillary service was considered to be co-located if the medical care site or its parent organization was mentioned as a source of a specific ancillary service on ten or more occasions. We also judged n ancillary service to be co-located if 30 percent of a medical care site's patients who used the service reported this medical care agency as the source of the service. For example, case management would be coded as co-located at a medical care agency, if ten or more patients at this agency also reported receiving case management there. The percentage criterion is more difficult to describe. If case management services are used 24 different times by patients at a particular medical site, case management services are regarded as co-located if they the location of 7 or more of the 24 instances of case management was the medical care site.

A linked care arrangement between a medical care site and another agency was indicated, when the same medical care agency and source of ancillary services was reported on 5 or more occasions. We selected this cut point, since the probability that a medical care agency and another agency would be linked together on five or more separate occasions was very small. We tabulated 2,171 instances where a patient's medical care site was paired with another agency as the source of one or more of the four ancillary services. Only 38 or less than 2 % of all such pairs were linked on five or more separate occasions. Although statistically rare, the threshold is still low in absolute terms. Therefore we interpret cautiously such "high" frequency pairings as indicating a formalized linked care arrangement.

Table 1. Definitions of Service Needs, Service Received & Unmet Service Needs

Service	SERVICE NEED	SERVICE RECEIVED	UNMET SERVICE NEEDS
Social Services			
Housing	Persons with unstable housing including double-up and homelessness	Received housing service- referral, information or advice, practical - in prior 6 months	No housing service received in prior 6 months
Substance Abuse	(1) Current drug or heavy alcohol user OR (2) client said that treatment or further treatment is “considerably” or “extremely” important	Received therapeutic or self-help AOD treatment in prior 6 months	No reported therapeutic or self-help AOD treatment in prior 6 months
Mental health	Scored very low on a mental health score (Mental component summary (MCS) $\leq$ 37.0)	Received professional mental health service (psychiatrist, psychologist, therapist, therapeutic social worker) in prior 6 months	Respondent did not report receipt of professional MH service (psychiatrist, psychologist, therapist, therapeutic social worker) in prior 6 months
Income Assistance	No full time or part time job	Received income assistance, such as SSDI, SSI, TANF and other public assistance, in prior 6 months	no job, but no income assistance, such as SSDI, SSI, TANF and other public assistance, in prior 6 months
Quality of Medical Care			
Appropriate medical care[1]	Positive HIV serostatus	Receive standards for appropriate medical care for HIV	Persons do not receive standards for appropriate medical care for HIV
Comprehensive medical care	Positive HIV serostatus	Primary HIV medical provider provide ALL of the following: (1) Routine check-ups, well visits, vaccinations, (2) Source of health advice, (3) 24-hour access for medical emergencies	Primary HIV medical provider does not provide ALL of the following: (1) Routine check-ups, well visits, vaccinations, (2) Source of health advice, (3) 24-hour access for medical emergencies
Antiretroviral therapy	T-cell less than 200	On antiretroviral combination therapy	Not on antiretroviral combination therapy
Treatment adherence	On antiretroviral medications	Receiving treatment adherence services	Among self-reported non-adherent, not receiving treatment adherence services

[1] Constructed by preferred practice guidelines from New York State AIDS Institute’s ‘Protocols for the Primary Care of HIV/AIDS in Adults and Adolescents’(November 1995) and the “Criteria for the Medical Care of Adults with HIV Infection’ by the AIDS Institute (March, 1998) and personal interviews with key program staff at the AIDS institute (Messeri et al, 2002, pS21). Appropriate medical care is defined If asymptomatic, not on antiretroviral therapy (ARV) = 1 visit/6 months; if on ARV or symptomatic or AIDS diagnosis = 2 visits/6 months, if CD4 count < 500 and viral load > 10,000, last visits happened within 4 months, and respondent reported both a physical exam and a blood test/work up in the last six months

Table 2: Layout of Dataset Used to Detect Possible Comprehensive Care Models

Participant ID	Round of Interview	Medical Care Agency	Ancillary Service Code*	Ancillary Service Agency
10001	1	1002	1	1002
10001	1	1002	2	1004
:	:	:	:	:
10001	4	1003	3	1003
:	:	:	:	:
10005	2	1051	2	1040
10005	2	1051	4	1051
10005	3	1051	1	1039
10005	3	1051	2	1040
10005	4	1051	2	1040
:	:	:	:	:
10400	5	1002	1	1002
10400	5	1002	2	1004
10400	6	1002	1	1002
:	:	:	:	:

*1=Case Management, 2=Mental Health Services, 3=Substance Abuse Services, 4=Housing Services

Results of the Search Process

A current source for HIV medical care was reported in 4,852 interviews conducted across 9 rounds of interviews (CHAIN participants could contribute multiple reports of medical care providers at each round interviewed). Forty-two (42) medical care sites met the inclusion criterion of being identified as a current source of HIV medical care on 10 or more interviews (occasions). These 42 sites account for 3,673 or 76 percent of all instances of current HIV medical care reported by CHAIN participants across all rounds of interviews. These 42 sites were the source of medical care for 556 or 80 percent of new CHAIN cohort members. Among medical care sites with fewer than 10 CHAIN participant encounters, 129 were private practices accounting for 9 percent of all medical care encounters and another 100 were clinics accounting for another 14 percent of encounters.

For each of the 42 eligible medical care sites, Table 3 presents information on the type of medical care organization, the number of CHAIN participants across all rounds of interviews and the number of CHAIN participants from the current cohort, who are patients. The left side of the table presents a simple schema for grouping the medical care sites. The key information on comprehensive care status is presented as a 4-digit numeric under the “Type” column. Each digit corresponds to one of the four ancillary services and indicates whether the service is co-located at the medical care site (1=10 or more times or 30% or more of the time), connected

through a linked care arrangement (2=offsite agency is paired with the medical care site 5 or more times), connected through both co-location and linked care arrangement (3), or not connected to medical care (0).

Table 3 suggests a natural division of eligible medical sites that corresponds to different levels of "comprehensive care." Thus 8 medical care sites are grouped at the highest level of comprehensive care. These sites have connections to all 4 ancillary services with 3 or 4 of the services co-located. Just below this level are 3 medical care sites that are connected to all 4 services, but two are co-located and two are connected through linked care arrangements. At the next level, we group 9 sites where 3 of 4 ancillary services are co-located. Next are three medical care sites that are connected to 3 ancillary services, one or two are provided by an outside agency. Thirteen medical care sites are connected to two ancillary services either through co-location or linked care arrangements. Finally the evidence points to little or no comprehensive care at 6 medical care sites, although onsite mental health services are available at three of the sites. Two residual categories include private practices(N=129) and clinics (N=100) that did not have enough observations to be included for reliable analysis. We assume that private office practices lack resources for creating comprehensive care models. No such assumption is made about the "low" frequency clinics.

Inspection of Table 3 indicates that case management followed by mental health services are the most often co-located ancillary services. In contrast, housing services are least often included in the mix of services; when present, they are more often than not connected through linkages to an outside agency. Substantial number of CHAIN participants received medical care from sites that cover the entire spectrum of "Comprehensiveness." For subsequent analyses we propose to combine the six original groupings into three levels: corresponding to what we will term maximum, moderate and minimum levels of comprehensive care (see Table 4).

Table 3 Classifying Types of Comprehensive Models - Top 42 Agencies[1]

(Original cohort: 700, Refresher cohort: 268, New Cohorts: N=693)

Level	# of network	#of colocation	Type[3]	Type of Organization[2]	# of cumulative client	# of current client
Maximum	4	4	1133	SS	28	4
		4	1113	SS	29	1
		4	1111	Dx Tx	12	11
		4	1111	HHC	13	0
		4	1111	CHC/clinic	32	0
		3	2333	HHC	115	37
		3	2331	Vol	88	36
		3	2313	Vol	99	12
		2	2332	Vol	101	55
		2	2332	Vol	106	15
		2	2211	Vol	28	1
Moderate	3	3	0113	HHC	44	23
		3	1110	CHC/clinic	43	16
		3	1110	CHC/clinic	34	3
		3	0111	Vol	18	13
		3	0111	HHC	15	8
		3	0111	Vol	27	6
		3	0111	Vol	59	6
		3	1110	CHC/clinic	11	2
		3	0111	HHC	34	1
		2	2330	Vol	58	22
		2	2310	Vol	59	39
		1	2302	Vol	44	22
Minimum	2	2	0110	Vol	111	42
		2	0330	HHC	26	2
		2	0110	Vol	85	41
		2	0110	Vol	35	29
		2	0011	Vol	23	11
		2	0110	Vol	26	10
		2	0110	CHC/clinic	10	9
		2	0011	HHC	15	5
		2	0110	CHC/clinic	14	4
		2	0110	CHC/clinic	31	2
		2	0110	HHC	16	1
		1	0120	CHC/clinic	16	16
		1	2300	Vol	36	5
	1	1	0010	HHC	27	10
		1	0010	Vol	11	5
		1	0010	HHC	17	4
	0	0	0000	Vol	30	21
		0	0000	Vol	14	5
		0	0000	Vol	19	1

[1]Agencies which have more than 10 CHAIN respondents (original cohort:700, refresher: 268, new cohort: 693) who had ever listed as their primary medical provider

[2] Type of Organization: HHC- New York City Health and Hospitals Corp; Vol- Voluntary Hospital; CHC/Clinic- Community Healthcare Network, SS- Social Service Center; Dx Tx- Drug Treatment Center

[3] Type of agency service : 1 colocation; 2 linkage; 3 both; 0 neither (Order of services=hs cm mh aod)

Table 4. Comprehensive Care Model Typology

Comprehensive Care Level	Number of Services in Network (either co-located or linked)	Number of Agencies	Cumulative Number of Interviews (N=4,852)	Current Cohort (N=693)
Maximum	4	11	1,525 (31%)	172 (25%)
Moderate	3	12	944 (19%)	161 (23%)
Minimum	2,1,0	19	1,179 (25%)	223 (32%)
Not Classified	Private Offices Clinics or other	129 100	442 (9%) 737 (15%)	31 (5%) 106 (15%)

Validating the Schema

We undertook a small validation study to assess how well this empirically driven approach based upon client utilization patterns corresponded to the perceptions of agency providers who serve CHAIN participants. For this study we interviewed informants at 12 of the 42 eligible sites. The informants held supervisory positions responsible for arranging ancillary services for clinic patients. We asked the informants whether the four ancillary services were available for their HIV+ patients within their unit or another unit or department within the larger parent agency. We next asked if their unit had developed "close working ties and even formal arrangements with other agencies to refer patients for each of the ancillary services." There was a high degree of correspondence between the two methods with respect to co-location of services. The CHAIN data and informant reports agreed in 40 of 48 (83%) possible service options (4 services at 12 sites). CHAIN data and key informants agreed on the presence of co-located services in 25 instances and agreed on the absence in 15 instances. All eight discrepancies involved the failure of CHAIN data to detect a co-located service when an informant indicated the presence of such a service. A careful examination of the pattern of discrepancies suggests that relaxing criteria for identifying co-location using the CHAIN data would not have improved the level of agreement.

The two data sources showed a low level of agreement when it came to identifying linked care arrangements. Agency informants repeatedly told us that minimal effort was devoted to developing formal referral agreements with other agencies. Several informants cautioned that their agencies secured written agreements with offsite agencies for purposes of funding applications, but staff were seldom constrained by these agreements in locating outside services for their patients. Most informants indicated that case management was available onsite, but patients in need of more intensive assistant could be referred to offsite COBRA case management programs. Mental health services were often arranged through services within the larger hospital system, which was also often the case for substance abuse treatment. Housing needs were typically addressed through informal arrangements with outside agencies. The 12 informants reported formal linkage arrangements with 15 offsite agencies. The CHAIN data identified possible linked care arrangements with 22 offsite locations. Among a total of 29

agencies were identified, only 8 were identified both by agency informants and through the participant utilization data.

Perhaps the most relevant measure for our analysis is the consistency of classifying sites across the three broad categories (maximum, moderate and minimal) used in this report to group the level of comprehensive care available at medical clinics. At this level of aggregation, 8 of the 12 sites (67%) were correctly classified. The level of agreement, though far from perfect, indicates that the study methodology does reasonably well at identifying co-located services. The search procedure was less successful in identifying offsite agencies that informants independently confirmed as having some form of linked care arrangements.

Patterns of Service Need and Utilization

The next set of tables present data on patterns of service need and use of ancillary services across different levels of comprehensive care. We first consider whether patients' needs for ancillary services differs by level of comprehensive care. Table 5 presents the percentages of clients at medical care sites falling into each comprehensive care group across all interviews with the old and new cohort and then separately for the new cohort. Definitions for service need are presented in Table 1. Income assistance represents a service need that is often addressed by a case manager. Table 5 indicates that no strong patterns emerge with respect to service needs.

Table 5. Pattern of Need for Ancillary Services

% with Service Need for	Level of Comprehensive Care					P-value
	Maximum	Moderate	Minimum	Not Classified	All	
Housing						
All Interviews	27%	16%	23%	26%	24%	0.000
Current Cohort	36%	18%	28%	27%	27%	0.003
Substance Abuse						
All Interviews	66%	58%	58%	58%	61%	0.000
Current Cohort	65%	58%	55%	59%	59%	0.267
Mental Health						
All Interviews	31%	27%	30%	33%	31%	0.012
Current Cohort	36%	31%	35%	42%	36%	0.307
Income Assistance						
All Interviews	88%	89%	84%	78%	85%	0.000
Current Cohort	84%	93%	89%	82%	87%	0.019
Mean Number of Service Needs						
All interviews	2.12	1.90	1.95	1.94	1.99	0.000
Current Cohort	2.21	1.99	2.07	2.09	2.09	0.262

P-values test hypothesis of equality of proportions between the five comprehensive care groups

It appears that when all services are considered together, patients in medical care with the highest level of comprehensive care also report the highest number of service needs both across all interventions and when restricted to the new cohort, although the difference in mean service needs is not statistically significant for the new cohort. Among individual services, no strong patterns emerge although patients in medical care sites with maximum comprehensive care exhibit somewhat elevated need for substance abuse and housing services.

Next we checked to see whether the algorithm, as intended, aggregates medical care sites by the level of concentration of patients who use ancillary services that are "in network"-- either co-located or located at an agency with a linked-care arrangement. (When a CHAIN participant reports sources of care that are both in and out of network, they are assigned "in network".) Specifically we would expect the concentration of "in network" use of ancillary services to increase with increasing "comprehensiveness." Sites not classified would be expected to fall towards the lower end because of the concentration of private practice sites. Tables 6 and 7 generally bear out this pattern. When data are combined across all interviews (Table 6), among patients receiving medical care sites rated to be in the maximum comprehensive care level, 48% of all ancillary services were obtained "in network." Virtually the same percentage of services are received "in network" among patients of sites grouped in the moderate comprehensive care level. The percent of "in network" use drops sharply for minimal comprehensive care sites and sites not classified. When the source of care is examined separately for each ancillary service, we find that percent of "in network" care increases with level of comprehensiveness for housing, mental health and substance abuse services. "In network" care is uniformly low for sites not classified. Case management departs from the above pattern, in so far as patients of moderate comprehensive care sites (54%) are more likely than those of maximum comprehensive sites (45%) to obtain "in network" case management services. "In network" case management is lower among medical care sites that have minimal comprehensive care or are not classified.

Housing services are much less likely than other ancillary services to be obtained "in network" across all comprehensive care levels. It is also apparent that the drop off "in network" care with declining level of comprehensive care is much more pronounced for substance abuse services than for either mental health or case management services. The patterns are essentially the same when the above analysis is limited to the current CHAIN cohort (Table 7). For the new cohort, the anomalous pattern for case management is diminished, but the concentration of "in network" substance services is now higher at moderate compared to maximum comprehensive care sites.

Table 6. Pattern of Services Used -All Interviews (N=4,852)

% using each kind of Services	Level of Comprehensive Care					P-value
	Maximum	Moderate	Minimum	Not Classified	All	
Total N =	1,525	944	1,204	1,179	4,852	
Housing (n)	(230)	(145)	(192)	(147)	(714)	0.000
In Network	33%	25%	10%	7%	20%	
Outside Network	67%	75%	90%	93%	80%	
Mental Health (n)	(457)	(211)	(360)	(329)	(1,357)	0.000
In Network	57%	52%	49%	18%	45%	
Outside Network	43%	48%	51%	82%	55%	
Substance Abuse (n)	(407)	(210)	(214)	(181)	(1,012)	0.000
In Network	58%	36%	17%	20%	38%	
Outside Network	42%	64%	83%	80%	62%	
Case Management (n)	(1,080)	(710)	(775)	(659)	(3,224)	0.000
In Network	45%	54%	39%	18%	40%	
Outside Network	55%	46%	61%	82%	60%	
Mean Number of Services						
Total	1.43	1.35	1.28	1.12	1.30	0.000
In Network	0.69	0.64	0.45	0.19	0.50	0.000
Percentages of in network services	48%	47%	25%	17%	38%	

Table 7. Pattern of Services Used - Current CHAIN Cohort (N=693)

% using each kind of Services	Level of Comprehensive Care					P-value
	Maximum	Moderate	Minimum	Not Classified	All	
Total N =	172	161	223	137	693	
Housing (n)	(34)	(24)	(40)	(22)	(120)	0.049
In Network	26%	13%	5%	9%	13%	
Outside Network	74%	87%	95%	91%	87%	
Mental Health (n)	(55)	(59)	(60)	(37)	(211)	0.000
In Network	80%	61%	53%	35%	59%	
Outside Network	20%	39%	47%	65%	41%	
Substance Abuse (n)	(28)	(31)	(31)	(18)	(108)	0.048
In Network	21%	35%	13%	6%	20%	
Outside Network	79%	65%	87%	94%	80%	
Case Management (n)	(125)	(127)	(166)	(84)	(502)	0.000
In Network	49%	50%	37%	23%	41%	
Outside Network	51%	50%	63%	77%	59%	
Mean Number of Services						
Total	1.41	1.50	1.33	1.18	1.36	0.021
In Network	0.70	0.70	0.44	0.26	0.53	0.000
Percentages of in network services	50%	47%	33%	22%	39%	

P-values test hypothesis of equality of means/proportions between the five comprehensive care groups.

Does Level of Comprehensive Care matter for accessing needed services and quality of medical care?

In this section we investigate whether the comprehensive care classification developed for this study is associated with meeting patient service needs and the quality of medical care they receive. If comprehensive care increases the options for readily available access to needed services, then we might expect that unmet service needs would be lower among patients of medical sites with higher levels of comprehensive care. Reduced levels of unmet needs for ancillary services would be expected to translate into a positive association between comprehensive care and medical care outcomes. Tables 8 through 11 present results of a series of analyses to assess these hypotheses. Definitions for all variables presented in this analysis are summarized in Table 1.

Table 8 displays the level of unmet need for each ancillary service among CHAIN participants grouped by the level of comprehensive care for their medical care sites. Tables 10 and 11 present results of regression analyses that estimate the difference in unmet service needs across levels of comprehensive care, which are adjusted for possible confounders. In all models, maximum comprehensive care is treated as a reference group. The regression coefficients for the remaining comprehensive care levels measure the incremental rate of unmet need above or below that obtained in the maximum level. Values greater than 1 indicate rates above the level for the maximum comprehensive care site. Values between 0 and 1 indicate lower rates. Table 10 presents estimates of regression coefficients in which the source of medical care is measured contemporaneously with whether or not a service is need is met. In Table 11, the regression analyses are repeated in a prospective manner. The source of medical care is measured at the interview previous to the one in which unmet service need is assessed.

To be consistent with our working hypothesis that patient service needs are better the care is comprehensive, the percentage of patients with an unmet need for services should be the lowest in the maximum comprehensive care grouping. Inspection of the row percentages in Table 8 seldom supports this prediction. Possibly, the true effects of comprehensive care are masked because medical care sites judged to have maximum comprehensiveness work with the most complicated cases. The regression analysis are designed to control for measurable aspects of patient mix. However adjustment for various patient differences also fails to detect a pattern of regression coefficient consistent with our working hypothesis.

Only individuals with substance abuse problems appear to benefit from receiving medical care at sites associated with the level of comprehensive medical care. For example, 28 percent of substance abusers receiving medical care at sites in the maximum comprehensive care level have unmet need for treatment services compared with 35 percent and 37 percent unmet needs for substance abusers receiving medical care in moderate and minimal comprehensive care sites respectively (Table 8). The regression models in Tables 10 and 11 are consistent with this possible benefit for substance abuse problems.

If comprehensive care benefits medical care outcomes, the patients from medical care sites placed in the maximum comprehensive care grouping would have the highest percentages in Table 9 compared to columns representing the lower comprehensive care levels.

Equivalently, the regression coefficients in Tables 10 and 11 for the medical outcomes would be less than 1. Inspection of Table 9 and the supporting regression analyses do not find any consistent pattern linking higher levels of comprehensive care to better medical outcomes.

Table 8. Unmet Service Needs

% with Unmet Need	Level of Comprehensive Care					P-value
	Maximum	Moderate	Minimum	Not Classified	All	
Total N=	1,525	944	1,204	1,179	4,852	
Housing						
(N with need)	(278)	(99)	(157)	(198)	(732)	
Unmet Need	33%	19%	27%	32%	28%	0.048
Substance Abuse						
(N with need)	(715)	(341)	(457)	(450)	(1,963)	
Unmet Need	28%	35%	37%	43%	35%	0.000
Mental Health						
(N with need)	(319)	(152)	(219)	(268)	(958)	
Unmet Need	30%	33%	30%	34%	32%	0.680
Income Assistance						
(N with need)	(930)	(509)	(628)	(600)	(2,667)	
Unmet Need	14%	15%	11%	16%	14%	0.046
Mean Number of Service Gaps						
(N with at least one need)	(1,007)	(539)	(704)	(712)	(2,962)	
Unmet Needs	0.76	0.71	0.71	0.85	0.76	0.006

Table 9. Quality of Medical Care Indicators

	Level of Comprehensive Care					P-value
	Maximum	Moderate	Minimum	Not Classified	All	
Total N=	1,525	944	1,204	1,179	4,852	
Appropriate HIV Care						
All Interviews	79%	79%	79%	60%	75%	0.000
Current Cohort	79%	75%	76%	59%	73%	0.000
Accessing Primary Medical Care						
All Interviews	65%	68%	63%	64%	65%	0.120
Current Cohort	79%	81%	78%	61%	76%	0.000
On HAART*						
All Interviews	57%	57%	63%	54%	58%	0.000
Current Cohort	56%	63%	70%	61%	63%	0.035
Completely Adherent**						
All Interviews	61%	65%	65%	69%	65%	0.058
Current Cohort	69%	70%	73%	74%	71%	0.786

* wave1-4 not included (n=2,684)
** among those who takes HIV medication(n=1,853 for cumulative, n=512 for current)
P-values test hypothesis of equality of proportions between the five comprehensive care groups

Table 10. Regression Analysis for Comprehensive Care Level:

Area	N	P-value	Moderate	Minimum	Not Classified
Unmet need for Ancillary Services					
Housing	732	0.011	.52*	.76	.92
Mental Health	958	0.073	1.07	1.08	1.32
Substance Abuse	1,963	0.000	1.22	1.40*	1.78***
Income Assistance	2,667	0.005	.96	.86	1.26
Number of Unmet Needs	2,962	0.000	.96	1.01	1.15
Medical Outcomes					
Appropriate HIV Care	3,191	0.000	1.10	.95	.42***
Access to Primary Care	3,146	0.000	1.18	.80+	.97
Currently on HAART	1,723	0.003	.89	.98	.84
Completely Adherent	1,189	0.004	1.25	1.04	1.54*

Table 11: Regression Analysis for Lagged Comprehensive Care Level:

Area	N	P-Value	Moderate	Minimum	Not Classified
Unmet need for Ancillary Services					
Housing	732	0.011	.63	.87	1.20
Mental Health	958	0.032	1.18	1.28	1.57*
Substance Abuse	1,963	0.000	1.16	1.60**	1.76***
Income Assistance	2,667	0.003	.91	.85	1.33+
Number of Unmet Needs	2,962	0.000	.98	1.09	1.20**
Medical Outcomes					
Appropriate HIV Care	3,191	0.000	.98	.91	.57***
Access to Primary Care	3,146	0.000	1.22	.82+	1.10
Currently on HAART	1,723	0.004	1.01	1.16	1.04
Completely Adherent	1,189	0.014	1.24	.97	1.23

+p<..1 *p<.05 **p<.01 ***p<.001

Reference group: Maximum Comprehensive Care. The coefficients for moderate, minimum and not classified groups are adjusted odds ratios fro all outcomes except number of unmet needs. For number of unmet needs, the regression analysis was fit to a Poisson mode. The regression coefficients are interpreted as incidence ratios.

Models adjust for ethnicity (Black, Hispanic), sex, MSM White male, age, educational level (less than high school graduate), lagged cd4 count (over 500, less than 200), lagged living with other people.

Conclusion

The benefits of comprehensive care are generally regarded as self evident. Many people with HIV are beset by multiple social and medical co-morbidities that interfere with effective medical management of HIV. Consequently concerted efforts to improve access to services that address such co-morbidities should help to ameliorate these conditions and consequently improve the effectiveness of HIV medical care. Formal mechanisms to coordinate delivery of care across different service sectors, thus building more comprehensive care models, should serve to counter service fragmentation that often interferes with finding and timely access of needed services. At least part of this paradigm is empirically well grounded. Many studies indicate that unstable housing, poor mental health and use and abuse of alcohol and other drugs are associated with lower quality medical care and poor medical care outcomes. Furthermore, engagement in quality HIV medical care is enhanced when individuals receive services that address these problems. What is not well established is whether formal efforts to organize such services into something called comprehensive care makes a difference.

This study underscores that it is difficult both to define and measure models of comprehensive care in a manner amenable to comparative analysis. In the absence of valid measures, statistical studies are not likely to generate strong evidence as to whether such efforts truly improve the delivery of medical care and its outcome. The null findings in this study do not necessarily indicate that comprehensive care doesn't work, but may be reasonably interpreted to indicate problems in both the definition and measurement of comprehensive care. For instance, Title IV manifestly funds comprehensive care models for children and families infected and affected with HIV(HRSA 2004). However, these models bring together a different basket of services than were selected for this study, since they focus on pediatric AIDS and the families affected by children living with AIDS, a segment of the HIV care system in New York City that does not loom large in the experiences of adult CHAIN participants. More generally, many medical care sites may well be justified to claim that they offer something appropriately labeled comprehensive care, but it is exceedingly difficult to identify the organizational features of such model that systematically differ in the basket of services that may be offered at other medical care sites.

This study does begin to point out a few features of the organization of medical and support features that may be the basis for distinguishing types or levels of comprehensive care. CHAIN data as supported by our key informant interviews underscore that case management and mental health are widely available onsite or within the larger parent organization among the major centers of HIV medical care in New York City. It is also apparent that there is limited effort in practice to develop formal referral arrangements with offsite agencies. It is left largely to the discretion of case managers to cultivate informal relationships with other agencies when developing offsite referrals for their clients. Other research using CHAIN data suggests that case management is the most consistent method for helping HIV infected individuals better integrate the array of services needed to manage multiple health and social problems.

The modest concordance between the CHAIN data and the key information interviews, particularly attempts to measure linked care arrangements, indicates that service utilization

patterns generated by patients is not, by itself, a reliable method for locating organized efforts to form comprehensive care model. Clearly interviews with appropriate supervisory staff are critical sources of information for measuring comprehensiveness. Equally important is a well formulated set of questions to obtain useful information. Vague questions about the nature of comprehensive care are likely to elicit response with little if any value for comparative analysis. Interviews must be carefully designed to ask about the availability of a bounded set of services, whether these services are available onsite, or if there are usual offsite referral sources for these services. It is equally important to determine accurately in what ways patient access to these services is coordinated. The coordination may be formalized in the form of written agreements or regulatory decrees. As the informants in this study clearly indicate, the presence of written agreements, per se, may have minimal bearing on referral patterns and informal arrangements between staff in different agencies developed through continuing exchanges over time may prove to be as binding as an formal edict. Much as we begin with a theoretical rationale as to why use of ancillary services might improve medical care outcomes, we need a theoretical guidance to identify alternative network development strategies for improving access and strengthening coordination that can then be measured and empirically assessed.

Key informants is a necessary but not completely reliable source of information on comprehensive care. The patient utilization data methodology developed for this study holds promise as a corroborating source of information. For instance, it is important to determine not only whether services are available onsite or through linked care arrangements, but how many patients actually choose to use services. The CHAIN data strongly suggest that even when services are available within a comprehensive care model, patients frequently obtain such services outside of network. This raises the question: when assessing the impact of comprehensive care on medical care outcomes, should analysis include or exclude patients who obtain ancillary services outside the comprehensive care model? Are the benefits of a comprehensive care limited to patients who use care within the system? Or is there some form of synergy such that all patients in a comprehensive care model benefit whether or not they choose to use the models services? Such questions merit more careful conceptualization and appropriate data collection strategies.

In the absence of a more definitive study, we offer a few concluding cautionary comments. It is important in evaluating the value of comprehensive care models to distinguish the impact of use of ancillary services from the organizational strategies employed to coordinate the delivery of such services. There is good evidence that use of different types of ancillary services improves the quality of medical care received and its outcome. However there is little evidence regarding the relative merits of different approaches to service coordination. We would argue that future evaluation research should continue to focus on comparative assessment of the three basic approaches to service coordination developed in this study: case management, service co-location, and link care arrangements. Useful information to assist policy on developing comprehensive care will best be served by devoting further thought and effort to devising creative and cost effective methods to measure comprehensive along dimensions of service mix and service coordination.

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