

APPENDIX C:

**SITE VISIT REPORT--
MONTEFIORE MEDICAL CARE,
BRONX, NEW YORK
AUGUST 2-4, 2006**

Health Settings visited: Montefiore Medical Center, Montefiore Home Health Agency (MHHA), the Visiting Nurse Service of New York (VNSNY), the Jewish Home and Hospital Agency (JHHA), and Schervier Nursing Care Center (Schervier).

I. OVERVIEW OF THE LOCATION/CITY AND VISITED HEALTH SETTINGS

New York State, and especially New York City and surrounding counties, have a relatively long history of collaboration in health information technology; this is one reason NY leads all other states in public health functionality and public health information technology and is among the leaders in the use of in-patient health information technology (HIT).

The majority of the site visit was located in the Bronx, a densely populated urban area with circumscribed geography. The Bronx patient demographics are characterized as “young, poor, minority, disease burdened, and underinsured.” For these and other reasons, Bronx residents tend to receive healthcare in the Bronx as opposed to the other New York boroughs and Montefiore is self-defined as the preferred acute care and primary care provider by the community, and the only Bronx academic medical center. Increased awareness of fragmented, multi-institutional,¹ and multi-level care and a long-standing sense of medical community have helped promote collaborative participation in the newly-funded Bronx regional health information organization (RHIO). One informant matter of factly stated that “geography is destiny,” meaning that the Bronx is six miles by six miles and this geographic reality is one explanation for why there is a greater proclivity for collaboration with other health settings in the Bronx. Another informant observed, “capitated care led the way,” meaning that capitated care provided clearer incentives for information sharing and use of HIT to support that sharing. Included in the population examined as part of Bronx RHIO planning were 27,000 “Medicare lives.”

Despite this advantage, of the high concentration of nursing homes located in the Bronx (53), only one (the **Jewish Home and Hospital Agency [JHHA]**) has so far agreed to be involved in the Bronx RHIO, which is moving from a planning and study phase to a deployment phase now that it has received \$4.1 million in HEAL NY funding. Not coincidentally, the Bronx has an excess of nursing home (NH) beds, at present. The **Schervier Nursing Care Center (Schervier)** was initially involved in the Bronx RHIO, but the Administrator determined that they were not ready, at present, to fulfill the technological requirements for participation so they dropped out. For an unknown reason, another large skilled nursing facility (SNF) in the area also dropped out of the RHIO, despite being involved in the planning stage discussions. Studies done prior to RHIO planning included attention to NH admissions, opportunities for hospital to NH-care coordination, avoidable hospital readmissions, and the distribution of hospital to long-term care transfers (49% of transfers to post-acute care from **Montefiore Medical Center** during the study period were to five NHs). Since the initiation of the Bronx

¹ 9,000 Bronx residents were admitted to two or more hospitals in 2004, accounting for 30,000 admissions.

RHIO, another four nursing homes have expressed interest in joining as institutional members.

Currently, the fact that the myriad of health care enterprises in the Bronx can communicate--person-to-person--at multiple organizational levels has not translated into electronic communication--or even person-to-computer communication. However, there seems to be some expectation that settings receiving patients should have remote access to patient information from where the patients came from, but at present, such hand-offs of electronic information are the exception rather than the norm.

The Bronx RHIO has a number of committees involved in various aspects of its design and implementation management. One committee is focusing on clinical issues and is in the process of defining an initial core data set of "normalized" information about individual patients that would be ready to be exchanged with all RHIO participants and be available at the point of care. Another part of the RHIO process links patient identifiers. The creation of a standardized patient transfer form for use in the Bronx and in the larger area covered by the VNSNY was discussed at several visited sites. Representatives at each site expressed interest in and some level of readiness for this transfer dataset to be finalized.

See Table C.1 at the end of this appendix for a comprehensive compilation of the information requested from and supplied by each site, prior to their scheduled site visit.

II. SPECIFICS ON CLINICAL DATA SHARING

1. What data are shared? What data should be shared but are not shared?

New York State requires that hospitals complete the Patient Review Instrument (PRI) for all patients being referred for Medicare Part A SNF care. This document scores the patient on the intensity of care required.² Its domains include physical and cognitive function, medications (last seven days), recent laboratory tests, x-rays, physical therapy (PT) and occupational therapy (OT) notes, and wound care. Ideally, this tool would help facilitate an appropriate match between patient care needs and care settings. Nursing staff must be certified on how to complete the PRI.³

More generally, the two nursing homes (NHs) we visited, **JHHA** and **Schervier**, made concrete suggestions for how Montefiore Medical Center could improve hospital to post-acute care information transfer. These suggestions included more frequent PT notes and especially greater documentation of mental status alteration and psychiatric/behavioral symptoms. NHs also would like the "look-back" period for medication reporting to extend to a full 14 days prior to NH admittance to help support

² <http://www.health.state.ny.us/forms/doh-694.pdf>.

³ http://www.health.state.ny.us/funding/rfp/0608071010/questions_and_answers.pdf.

completion of IV medication use required by the RUGs, thereby ensuring they are adequately reimbursed for more expensive services.

When a patient leaves JHHA (to go back to the hospital or discharged home), a discharge packet is prepared that includes a medical summary of recent events completed by the physician, a handwritten medication list, immunizations (to conform to current hospital quality initiatives), EKG, and laboratory tests.

When NH staff at **Schervier** transfer a patient to an emergency department (ED) or hospital, they attach a paper-based Schervier-standard patient summary including a transfer form (which describes the reason for transfer), physician transfer sheets, laboratory results, x-rays, and ECG.

The **VNSNY** has pilot projects underway that will implement data sharing with selected physician offices and, separately, with Weill Cornell Medical Center. The **Montefiore HHA (MHHA)** has a pilot project in place to share information with physicians via a web portal. (See Section III.2 for more details.)

2. How are the data shared?

The Patient Review Instrument (PRI) and supplemental information are distributed from Montefiore Medical Center to local area NHs via Extended Care Information Network (ECIN),⁴ which is a web-accessible application designed to facilitate the discharge process. ECIN is an Internet-based automated PRI that is HL7 compliant. Nursing homes pay \$300/month to subscribe and, at present, 30 Bronx NHs make use of ECIN. Patient information is sent to a list of NHs selected from an on-line pick-list. When a referral arrives at a selected NH, an e-mail or page alerts the staff. The receiving NH then has the opportunity to e-mail back or call to ask questions and/or indicate its interest in accepting the patient. NHs without ECIN access may receive the PRI via fax. According to informants at Montefiore, their use of ECIN has helped reduce hospital length of stay (LOS) for nursing home bound patients from ten to eight days--in a context where a half-day reduction in LOS would pay for incremental use of information technology.

At **Montefiore**, PRI fields such as demographics and insurance can be auto-populated using information from other information systems, while other fields such as laboratories, medications, and physical therapy notes can be completed by copying and pasting from data fields in the Montefiore EHR. Prior to automation (auto-population), tool-supported creation of the PRI required 30-40 minutes to complete, whereas after automated pre-population and manual copying and pasting, it reportedly is completed in 10-15 minutes.

The **MHHA** uses MISYS for documentation and charting. If a patient is admitted to Montefiore Medical Center while actively receiving home health care, the home care coordinator based in the hospital can print a summary from MISYS and place that

⁴ <http://www.extendedcare.com/>.

summary in the hospital paper record. Aside from this, emergency department (ED) and hospital nurses and physicians do not have access to MISYS. At present, the only way that MISYS and the Montefiore EHR (IDX LastWord) “interoperate” is via e-mail. MHHA has a field dedicated to capture the patient’s Montefiore Medical Record Number. All documentation that is generated to the physician (e.g., orders, discharge summary, admission notice) will include the Medical Record Number to make patient identification for documentation for the medical record seamless. MHHA has a process in place that auto-e-mails the physician when her or his patient is admitted to home care. The e-mail contains contact information of the team caring for the patient as well as the date the patient was admitted. In general, e-mail appears to be used increasingly often for fulfillment of non-time-critical information needs, much as voice mail is still used today. MHHA staff have read-only access to Montefiore Medical Center’s clinical information system (CIS). Montefiore representatives also commented that the JHHA physicians have limited read-only access to CIS, and these physicians would like to expand their access. For example, informants at JHHA indicated that care providers cannot always get access to laboratory results or radiology images in Montefiore’s CIS and they cannot access the medication list, although this access has been requested for several years.

When a patient is discharged from home health services, a discharge template in MISYS is used that is populated in part by MISYS and in part completed by a nurse who manually types in the remaining fields. The information typed into the EHR could be blood sugar ranges if the patient is a diabetic, wound status if the patient is being seen by the wound care team, or care providers at home. This type of information is patient-specific and is not captured via check boxes. The resulting summary is then sent to the attending physician via email.

The **VNSNY** pilots are implementing “back population” of EHRs at selected physician offices; this data transfer will make use of a web portal and HL7 messaging. The application being developed in collaboration with Weill Cornell Medical Center is web-based. The MISYS Physician Portal also is web-based and **MHHA** recently received a grant to modify the portal to allow the physician to access telehealth reports.

3. Timeliness and completeness of the data.

NH staff at **JHHA** and **Schervier** both commented that despite the fact that nursing staff require special certification to complete the PRI, the data contained within the PRI can be of inconsistent quality and is often incomplete. The information available from ECIN is similarly variable.

JHHA reports that the hospital discharge summary arrives with the patient (rather than prior to nursing home admission) and occasionally is misplaced or lost during this transition.

Schervier staff create their own paper medical record using some of the data received from the hospital. Staff commented that they would like to receive a discharge

summary ahead of time but it frequently arrives with the patient, which reduces their ability to prepare to meet the patient's needs upon arrival. They also mentioned that the PRI does not always adequately describe the patient. For example, NHs are particularly interested in the mental and psychiatric status of referred patients. The discharge summary from **Montefiore** often is illegible, as it is a carbon copy, and the Schervier informants mentioned that about 80% of the time, the primary care physician information is not included in the discharge packet.

The **VNSNY** tries to re-synchronize all patient information between care provider tablet and laptop computers and backend databases at least once every 24 hours. **MHHA** care providers (e.g., nurses, social workers, therapists) are required to synchronize their laptops once every 24 hours. MHHA recently deployed 50+ broadband wireless cards allowing staff to connect to the office while in the field.

4. Specifics about medications, laboratories, and radiology.

The **Montefiore** EHR integrates access to a medication list (Montefiore has a single in-patient pharmacy), lab results (if done by the Montefiore laboratory), and imaging reports. At present, none of these data elements are represented using national standards; when the relevant decisions were made there was no reason to use these standards. However, to better support re-use of such data elements by RHIO participants, such standards are an objective for the Bronx RHIO.

All **MHHA** laboratory results go to the Montefiore Medical Center's clinical lab, thereby enabling timely access to results by ordering staff physicians.

JHHA has an in-house pharmacy and uses a single lab. JHHA staff have read-only access to a patient's laboratory results performed at Montefiore Medical Center prior to transfer as well as radiology reports, but they do not have access to medication data.

Schervier uses one outside pharmacy, Shore Pharmacy, and a single lab, Lawrence Laboratory. The nursing unit has view-only computer access to the laboratory results from Lawrence Lab.

5. Areas under development (e.g., CPOE, decision-making tools).

Through a New York State HEAL NY award, the **VNSNY** is developing a portal for physicians with a common data presentation. The goal is to improve communication and specifically to reduce complications, duplication, and need for re-hospitalization. Portal information will include data elements that the VNSNY routinely collects, including hospital discharge summaries, radiology/lab/ECG reports, name of PCP, names of family caregivers, advance directives (whether or not on file), and wound images. The information will go directly into the electronic health record (EHR), which the physician's office is using as well as the VNSNY medical record. Currently, the VNSNY is piloting the web portal with seven regional physician practices that all use GE

Centricity/Logician EHR. (Contemporary software features of the Logician EHR system reduce the difficulty of implementing this “back-population,” relative to other EHRs.) The VNSNY already is observing an anticipated change in their relationship with MDs using the portal--“the MDs are new users with new requirements.” While the current goal of this effort is to (greatly) improve access to information about patients common to the MDs and the VNSNY, this access could support use of standards in the future.

The **VNSNY** also is participating in a pilot project with Weill Cornell Medical Center to develop an electronic CMS 485 form where the doctor could begin to write orders on the 485 at the time of discharge.⁵ The physician can sign the original 485 and any subsequent additions electronically. This advancement also would allow them to map data elements to the Continuity of Care Record (CCR). One advantage for physicians is that this feature includes a timer that can count minutes spent on home care oversight to facilitate documentation for billing. The electronic 485 has led to enhanced data completion. For example, the physical function section went from 28% complete to 94% complete and mental status went from 6% complete to 100% complete in a pilot study of four physician practices.

The **VNSNY** also is piloting a home monitoring project. In January 2007, they will be able to take results from the telehealth devices in the home and incorporate these data into the current database. They then would be able to trend these data with other data their clinicians have collected to get a more complete, accurate picture of the home care patient’s health status.

MHHA currently has a home monitoring project in place with Cardiocom. MISYS has partnered with Cardiocom to build a bi-directional HL7 interface that will allow information to flow seamlessly from the devices to the MHHA EHR.

JHHA is developing a database to establish a unique identifier that will be the basis for sharing information among all JHHA programs and services. Not coincidentally, this identifier will make it easier for JHHA to share patient information through the Bronx RHIO.

6. Barriers to clinical data exchange.

Montefiore Medical Center’s EHR (CIS) and the **MHHA’s** record system (MISYS) do not interoperate. For example, when a laboratory result appears in the CIS, the result must be entered manually into MISYS. Medications also are transferred manually from one screen in CIS to another in MISYS. HHA staff acknowledges the potential for transcription errors.

Representatives from the **VNSNY** indicated that communication streams that currently exist with Montefiore Medical Center are potentially subject to errors. For

⁵ <http://www.ahrq.gov/research/idsrnproj04.htm>.

example, Montefiore liaisons have to fax the referral form to VNS headquarters and those data are then re-entered into the VNS electronic health record.

Challenges noted by **Schervier** staff are completeness of the information from the referring hospital (not necessarily just Montefiore Medical Center, but any referring hospital) and inaccuracy of the data that is sent, thereby reducing trustworthiness of the information. For example, descriptions of ongoing expensive medications or treatments (e.g., IVs, blood transfusions, chemotherapy) often do not accompany the patient and the SNF is forced to scour the information available to them to determine if the patient is on medications that will affect their RUG payments.

The biggest current barrier to clinical data exchange among the sites visited is a lack of electronic communication between existing information systems; not surprisingly, this is a major motivation behind planning for the Bronx RHIO. The next barrier will be the need to transform local electronic health information into the uniform patient summary required by the RHIO. After that, the biggest challenge will be the need to back-populate local health information with that available from the RHIO (e.g., to enable better local decision support through a more complete medication list, laboratory results, and problem list).

7. Facilitators to clinical data exchange.

As described above, the main facilitator to future electronic clinical data exchange is a regional organizational history of inter-enterprise (care provider-to-care provider) communication and inter-enterprise patient care. Beyond this, Montefiore Medical Center and MHHA plan to use a single patient identifier to track patients in their electronic health information system so that historical data in the Montefiore system are accessible and they can ensure that the patient they are treating is the correct patient. Among other benefits, this single identifier increases the utility of the Montefiore data warehouse. Because most Montefiore patients continue to receive care at Montefiore health settings for as long as they live in the Bronx, this creates an opportunity for a rich, life-long patient health record.

Montefiore Medical Center staff physicians (hospitalists) care for hospitalized nursing home patients. A different group of Montefiore staff physicians care for nursing homes patients in the nursing home (SNFists). Having organized physician groups employed by the regional provider creates an opportunity to develop more standardized protocols for patient care, including clinical protocols and higher expectations for information exchange.

MHHA has on-site care coordinators/liaisons in the Montefiore Medical Center to facilitate hospital-to-HHA referrals. It also has coordinators who visit two or three of the larger SNFs to help facilitate referrals from SNF to home care.

Another example of existing manual clinical data exchange across enterprises is weekly visits by HHA liaisons from **Montefiore Medical Center** and the **VNSNY** to

JHHA to review and coordinate potential referrals. By being on site, these liaisons are able to collect and communicate needed clinical information to their respective employer (the VNSNY or JHHA) on soon-to-be discharged patients.

State-of-the-art information technology used by the VNSNY will be make it relatively easy to exchange patient data going forward with HIT systems at referring sites and with many EHRs used by primary care MDs who follow the patients during and after care by the VNSNY.

A fundamental facilitator of anticipated information exchange is the general computer literacy of regional care providers and their growing expectation that anytime/anywhere access to patient information should be supported.

III. TECHNOLOGY

1. Hardware and software descriptions of the main health delivery system and the affiliated PAC/LTC settings.

Back in 1995, after a year-long search, including visits to United States academic medical centers with EHRs, **Montefiore Medical Center** selected IDX's LastWord EHR based on its ability to function in an integrated delivery system, and because it was perceived as user-friendly for physicians. Deployed initially as an in-patient EHR, LastWord was deployed for ambulatory care at 28 sites in 1996-1997. LastWord contains data from every Montefiore encounter for 1.8 million patients; currently this includes laboratory test results, medications, and images, but does not include notes and consults. Some scanned information also is represented. E-prescribing has been in place for close to a year. Currently, about 9,000 NH patients/year use Montefiore's hospitals for inpatient care. Greg Burke, Vice President of Planning mentioned a recent study of Medicare claims data performed by Milliman that indicated that in the Bronx, two-thirds of the NH patients who die, die as hospital inpatients, and that about one-third of the Medicare-enrolled NH population die per year. As with several other deployed EHRs, LastWord was originally implemented in MUMPS. (IDX was purchased by General Electric in June 2006). Montefiore's deployment of LastWord makes use of the proprietary physician-friendly problem-list vocabulary developed by James Campbell, MD. One feature of this list is the accompanying repertoire of links to SNOMED-CT. Primary care physicians "own" this problem list, and, at present, ED physicians do not have the authorization to update it. Because LastWord is not designed for population analysis and other aggregative data tasks, Montefiore Medical Center makes use of an adjacent Sybase data warehouse. The warehouse accumulates query-able patient information exported regularly from LastWord. The warehouse environment supports a growing repertoire of analytic reports, some of which were used as part of RHIO planning. Current RHIO plans call for use of a dBMotion product to extract the RHIO-standard information from EHRs and other patient information systems used by RHIO participants. One side of each dBMotion

instance does the local extraction and the other side makes the patient information available in standard form to external RHIO users.

MHA uses MISYS Homecare software for their EHR. Field clinicians can instantly access health care plans, patient demographics, medications, and other clinical information to improve quality of care. OASIS data collection is integrated into the patient health assessment. Assessments captured on laptops at the point of care are remotely synchronized to the EHR in minutes. Field staff is required to synchronize their laptops a minimum of once every 24 hours.

Fourteen years ago the **VNSNY** began developing its own patient record system that continues to evolve to this day and currently supports more than 2,000 care providers. One reason that the VNSNY developed custom software is that there was so little available when they started. Currently, their system makes use of a three-tier architecture--an outer tier of software residing on care providers' tablet computers and laptops, a middle tier of management and system applications and asynchronous communication support, and an inner tier of DB2 relational databases. The point-of-care (POC) component is written in Microsoft Visual Basic with a supporting Microsoft client Data Engine SQL database. Office-based management and analytic tasks are conducted either by using mainframe IBM Customer Information Control System (CICS) COBOL applications or web-based Java applications. Data are synchronized between the POC and host DB2 databases using internally-developed store and forward processing via an intermediary RISC-based processor. Thus, each morning each home health clinician has access to her or his caseload for the day. During the day, case workers record information on tablet computers. While unique, the VNSNY's EHR system has been built whenever possible using commercial-off-the-shelf (COTS) systems and tools, such as SQL Server and Visual Basic. The VNSNY's advanced information technology position was achieved at the cost of some less successful efforts along the way (e.g., premature attempts to get tablet computers deployed). However, their ability to contemplate participation in multiple RHIOs and to experiment with connections to physician practices is evidence of the soundness of their investment in scalable designs and components. They are in an increasingly better position to learn more about the appropriate use of information technology in home care settings. One important source of experiential learning is their current management of content and software updates; for example, formulary updates are pushed (sent) to the care provider laptops--the outer layer of the three tiered architecture--on demand, and twice annually these laptops are brought to headquarters for major updates to software and "geriatric decision support." The latter generates a "problem" for each medication and therapy, and constellations of problems make explicit potential connections between congestive heart failure and depression. Currently, e-mail is not considered secure enough to use in home care provider communications involving patient information. Incrementally, the VNSNY system involves workflow management (e.g., management of lab tests, beginning with physicians currently phoning in orders, and ending with faxing the result to the physician). In between, the laboratories have access to the relevant work-lists and dispatching of phlebotomists. The VNSNY has a grant to implement the receipt of laboratory tests in HL7 messages containing LOINC codes.

MHHA decided against developing their own software product and instead purchased their EHR from MISYS Healthcare, a recognized leader in the homecare field. By partnering with MISYS, MHHA can utilize their clinical and process knowledge with their software expertise to build an efficient EHR that meets every one of their needs and can be used by other home care agencies across the county. MHHA is “Premier Partner” with MISYS, which allows them access to developers and other business partners. MHHA has used this status to request custom functions for streamlining the admissions process.

More recently, **JHHA** has been exploring different EHR alternatives but currently uses only “component” systems such as the QS1 Pharmacy System.⁶ Also used are the 3M Home Care program, and a scheduling and billing system--where indications accompany orders. The MISYS (formerly Per Se) Patient1 system was deployed during a recent trial but the expense of adapting the propriety database outweighed any other benefits of that system and the trial was terminated. The currently deployed ADT system stores a problem list with ICD coding and it can be used to generate a face sheet. The Lintech Comet system is used to complete and submit MDS, develop associated care planning, and support some order entry.⁷ OASIS submissions are handled using OCS.⁸ JHHA is networked, mainly for administrative purposes, with other affiliated sites in Manhattan and the Bronx, including community services and a primary care site. Another site supports redundant data that will be used for data disaster recovery.

Schervier uses American Health Care management software at present, and looks forward to the day when they will have a more robust EHR. They estimate that a satisfactory EHR will cost more than \$750,000/year. The American Health Care software is specialized for long-term care and includes an MDS-reporting application. Their current extra-enterprise communication makes use of faxes and remote access for laboratory test results and they do not yet have computers available on care units.

2. Architecture of EHR system at main HDS.

- a. Are they using CHI-endorsed and other HIT content and messaging standards? If so, which ones are they using? Messaging? Vocabulary? Direct care FM?

Current use of formerly CHI-endorsed and, prospectively Health Information Technology Standards Panel (HITSP)⁹ endorsed standards, such as ICD-9-CM and CPT, is incidental and not because of any perceived benefit of use of these standards, other than that they are required for regulatory or reimbursement reasons; again, decisions to use particular terminologies were made some time ago, before CHI existed.

⁶ <http://www.qs1.com/qs1home.nsf/Web+Pages/RxCare+Plus?OpenDocument>.

⁷ <http://www.cometechnology.com/>.

⁸ <http://marketing.ocsys.com/aboutocs.asp>.

⁹ http://www.ansi.org/standards_activities/standards_boards_panels/hisb/hitsp.aspx?menuid=3.

HL7 messaging is part of RHIO planning and HL7 capabilities (e.g., as part of ECIN) came up in discussion, but no use of HL7 messaging was observed. No site contemplated use of RxNorm for medication lists, and all sites made use of one or more proprietary formularies, such as First Databank or Micromedex.

Montefiore Medical Center created their lab codes before LOINC was available. They have been evaluating LOINC adoption along with the other RHIO participants and face the same challenge as other United States care enterprises in that they have homegrown coding systems, especially for lab tests.

b. Description of each EHR system and HIT solution(s) to support HIE

Each site visited had some deployed patient-care information technology. However, the only mode of HIE observed besides faxing and phoning was occasional remote access, usually by physicians. All sites have planned HIT enhancements; some of these are specifically focused on anticipated RHIO involvement, and others are unilateral.

All HIE observed was manual; sometimes this manual access was electronically remote, enabling users to create data in one system while viewing it in another. Usually, this step was described as “taking ownership” of the data (e.g., the patient’s medication list). Included in taking ownership is medication reconciliation.

3. Architecture of EHR systems at PAC/LTC (if applicable) and HIT solution(s) to support HIE.

All architectures observed were based on a central computer access through real-time networks, except in the case of the **VNSNY**, which used episodic (e.g., daily) network connections to tablet or laptop computers for resynchronization. As described above, Montefiore makes use of a Sybase warehouse that supports non-real-time access to patient information exported from LastWord. Web-based, anytime/anywhere connections were not observed at any site, although support for such applications was being contemplated as part of the Bronx RHIO and VNSNY pilots. Lack of any current deployment of HIE is a major reason behind the selection of dBMotion as a RHIO-common interface for Bronx RHIO members. dBMotion supports secure, virtual patient records.¹⁰ dBMotion is an architectural solution that supports a uniform interface to uniform extractions from each native system at each RHIO site. The dBMotion solution does not commit users to any particular HL7, CHI, or HITSP standard, instead it allows the RHIO to support an elective, collective repertoire of standards in the virtual patient record. This repertoire has yet to be defined. One reason for this delay is that each site would then be required to translate local information into RHIO-standard information. Currently, the degree to which dBMotion will support such translations has yet to be determined.

¹⁰ <http://www.hospitalmanagement.net/contractors/it/dbmotion/dbmotion3.html>.

4. How are the data stored? Shared? Accessed? Transmitted? Accepted at other setting? Entered? Etc.

All sites observed store patient data in proprietary formats and databases in commercial applications, except for **Montefiore**, **MHHA**, and the **VNSNY**. The proprietary nature of how the data are stored was one reason why JHHA stopped deployment of a COTS EHR. The latter sites have information technology staff sufficient to support some storage and access via standard SQL. Montefiore Medical Center maintains a data warehouse of historical patient records accessible using (Sybase) SQL and this warehouse is updated regularly by exporting information from LastWord, the Montefiore EHR. The VNSNY uses backend (DB2) and laptop (Microsoft) client databases accessible using IBM and Microsoft SQL. Except for the JHHA use of read-only CIS terminals to access clinical information in Montefiore's system and the VNSNY physician office pilots, we observed no extra-enterprise data sharing other than by paper, faxes, phone calls, and limited dial-up access.

Although the VNSNY certainly has the information technology expertise and capital to build interfaces with either ECIN or e-discharge, they have opted not to invest in this effort. As the largest home health agency in the county, they have a 25,000 patient load at any one time and are the home health agency many opt to refer to with "difficult" patients.

As observed earlier in this report, all sites reported re-entering patient information manually that came from a computer somewhere else. Each site saw this as taking ownership of the data.

5. How are you tackling any interoperability issues using standards-based EHR systems or other HIT solutions for health information exchange?

Although **JHHA** expressed interest in improving the bilateral exchange of data with care enterprises such as Montefiore, no site except the **VNSNY** described plans for bilateral interoperation. As previously mentioned, the VNSNY has pilots underway to exchange information with physician practices, and plans in place to interoperate with regional medical centers such as Weill Cornell. All sites visited anticipated being part of the Bronx RHIO either right away, or, in the case of **Schervier**, when facilities and funding permitted. The RHIO plans include anticipated potential use of a variety of standards, but no specifics are yet available.

6. How does electronic health information exchange (e-HIE) vary between affiliated and unaffiliated providers within a single HDS?

Of the sites visited, only the **MHHA** had a strong affiliation with another visited site, **Montefiore Medical Center**. This affiliation smoothed referrals, "most referrals are from our (Montefiore) system," but these referrals did not include HIE. Instead, the MHHA employed 18 nursing FTEs to workup each patient prior to field care. Access

variation is usually organizationally mediated; that is, affiliation determines who may have remote access to patient information from the “sending” care site.

Montefiore Medical Center plans to exchange summary information with Bronx RHIO members. Today, the only extra-enterprise data sharing of consequence, besides selective dial-up access, takes place through the PRI and ECIN.

JHHA is not affiliated with other care providers except through common training programs, such as with Mt. Sinai.

Schervier is part of the Bon Secours Health System, which is comprised of acute and non-acute care facilities but not affiliated with any New York City health care providers.

7. How does e-HIE vary when exchanging to outside entities?

Montefiore Medical Center's information technology subsidiary, Emerging Health Information Technologies (EHIT), provides HIE services under contractual relationships to a number of other hospitals, including Bronx-Lebanon Hospital Center in the Bronx. EHIT also is the technology provider to the Bronx RHIO. It does not currently support e-HIE services with PAC/LTC beyond its organization, except for its use of ECIN.

MHHA does not support e-HIE beyond its organization except for its use of ECIN and planned participation in the Bronx RHIO.

JHHA does not support e-HIE beyond its organization, though it looks forward to participating in the Bronx RHIO.

Schervier does not support e-HIE beyond its organization, and has temporarily withdrawn from the Bronx RHIO. Schervier plans to purchase an EHR, but there is no schedule yet for doing so.

All sites found the current manual (fax, phone, or paper) bilateral exchanges of information inadequate and problematic, although some pairs of enterprises reported better paper exchanges than with other pairs. All sites found their use of ECIN an improvement over the way things were before it was available, but no site believes ECIN will be adequate indefinitely.

The **VNSNY's** future plans already have been extensively discussed in this report (see Section II.5).

IV. ORGANIZATIONAL ISSUES

1. Organizational Activities Supporting Electronic HIE.

Montefiore Medical Center has invested significant resources in the development of the business case for implementing and promoting electronic HIE across its extensive delivery system and within the region, as is evidenced by their leadership in promoting the Bronx RHIO, and being a key player in the grant writing process that led to the HEAL-NY award to form this RHIO.

JHHA and **Schervier** (the two NHs we visited) are both large, well-established skilled nursing facilities who have weighed the pros and cons of implementing an EHR, including one that has interoperable features with other health settings. Both SNFs are committed to providing quality care and are not averse to using technology to support or improve their care provision. That said, neither SNF has been particularly impressed with the software options available to SNFs in the current market. JHHA, for example, invested in an EHR, including all of the start-up hardware, software, and training costs, only to jettison it several years later when the leadership realized that the software capabilities were not as promised, and ultimately, it was not able to meet their organizational needs. At this time, JHHA currently is vetting other software options and is hoping to implement one in the next year.

Although **Schervier** was initially involved in the formation of the Bronx RHIO, the director declined to participate when commitments were being requested because she said they “were not ready.” They continue to collect most of their data on paper and enter the data into niche software--American Health Care Software--that does not interoperate with other systems.

The **VNSNY**, on the other hand, has a very sophisticated, well-funded information technology department that is involved in or planning a number of internally and externally funded standards-based initiatives to encourage and facilitate electronic HIE. These planned activities are discussed in detail in Section II.5 above. The bulk of their EHR system is homegrown and was built up over more than a decade of development, as they were and continue to be an early adopter of information technology.

2. Adoption of EHR systems.

None of the settings we visited necessarily selected their vendor(s) based on criteria such as use of CHI-endorsed standards or ability to interoperate with other systems.

Some health settings were early adopters of EHR systems (e.g., **Montefiore**, **JHHA**, **VNSNY**) and CHI-endorsed standards were not in place at the time they were selecting software. Montefiore Medical Center selected their EHR system in the mid-1990s, well before standards were being used in the development of EHR systems.

The VNSNY found the home health software options wanting and opted to build their own EHR system.

As previously mentioned, **Montefiore Medical Center** and **JHHA** are heavily involved in the formation and implementation of the Bronx RHIO, having devoted significant resources to obtain the funding and persuading other participants to join. They are committed to and involved in efforts supporting interoperability among systems, albeit in the early stages. Montefiore has representation on some of the standards development organizations (SDOs). For example, the chief radiologist sits on the IHE standards board, others are involved with e-health Initiative, and others are involved in SDOs that focus on the financial/billing side of healthcare. The **VNSNY** has a very active, energetic, vocal information technology group, led by Tom Check, and they are educated on and involved in a number of SDOs.

In contrast, **Schervier Nursing Care Center**, which uses niche software (American Health), did not consider use of standards or interoperability when selecting this software vendor. Schervier is just one SNF in the Bon Secours New York Health System and the Bon Secours corporate office determined which software best met the organizations needs.

In general, most SNF clinicians and administrators we visited in New York (and elsewhere) have very modest, reasonable goals with respect to data exchange. They are most interested in having complete, accurate, legible, and timely data, regardless of the format. That is, a legible printout from a computer that is received prior to patient admission and contains complete accurate information would be considered a “big win.” Interestingly, all sites reported wanting more complete information, while admitting that there was an implied risk to getting “too much” information, because they would be liable for providing care in that context. Thus, receiving electronic data that are both machine and human readable, as opposed to just human readable, is not necessarily their immediate goal, or even a consideration in the near term.

Bronx RHIO participants are committed to a relatively advanced form of patient information exchange, through which providers in or affiliated with participating organizations will be able to access locally-generated electronic information--a specified core data set that abstracts what that site knows about the patient’s local encounters. The encounter might be a laboratory test result or it might be a visit to the local VA facility. For a given patient, at a given site, these distributed data sets form a series of virtual longitudinal patient records. A care provider at another site can retrieve and display a consolidated view of clinical information from all participating organizations as a “message” to be viewed locally. Further, in principle, each core data set has “normalized” data elements, potentially using standard terminology; therefore, in principle, a unified medication list could be created, for instance. While details remain to be determined and no testing has yet taken place, evidence of the extent of prior and current collaboration is the energy and planning that have gone into the RHIO proposal and plans.

V. CONCLUSION/FINAL THOUGHTS

The Bronx and Manhattan sites visited represent a significant opportunity for HIE. Currently, information about thousands of patients flows between care sites as part of relatively mature manual--fax, phone, and paper--processes. Thus, the collaborations necessary to support HIE exist or can be created, and there appear to be few competitive barriers to interoperability. That said, these enterprises face the myriad technical choices and tradeoffs required to start electronic information flowing between non-affiliated care enterprises using non-common HIT. However, over the last few decades, New York State and the New York Metropolitan area have demonstrated an ability to successfully undertake large health care projects, many involving the use of HIT, and this has created an expectation that they will succeed in deploying a useful, sustainable RHIO.

Name of Health System	Montefiore Medical Center	Montefiore Home Health Agency (MHHA)	Visiting Nurse Service of New York (VNSNY)	Jewish Home and Hospital Bronx Division**	Bon Secours New York Health System (Schervier Nursing Care Center)
Location	Bronx, NY	Bronx, NY	New York, NY	Bronx, NY	Riverdale, NY
Year established	1882	1947	1893	1950	1938 SNCC 1983 Home Care
Area served (urban, rural, both)	Urban	Urban	Urban, suburban	Urban	Urban--SNCC Both--Home Care
Ownership	Non-profit	Non-profit	Non-profit	Non-profit	Non-profit, freestanding
No. full-time employees	10,000	266	Approx. 11,700	Approx. 1,000 in Bronx Division	450
No. of Nursing Homes (owned, affiliated)	0 owned 30 Affiliated	0--we have liaisons on site at 3 NHs	n/a	3 owned	1 owned
No. of Home Health Agencies (owned, affiliated)	1 owned	1 owned	1 owned	1 owned	1 owned
No. of Physician Practices (owned, affiliated)	21 Primary Care (owned)			1 owned	0 owned
Are physicians affiliated with health delivery system or are they independent?	Both 1,000 FT faculty 1,000 voluntary	MHHA receives referrals from physicians who are employees of the health system and from physicians who have their own practices.	There are some MDs on staff in Hospice, our managed care plan, etc., but they are staff within programs. VNS obtains referrals from many MD practices and hospitals. They are independent and have only a referral relationship with VNSNY.	They are employees of JHHLS.	Independent

TABLE C.1 (continued)

Name of Health System	Montefiore Medical Center	Montefiore Home Health Agency (MHHA)	Visiting Nurse Service of New York (VNSNY)	Jewish Home and Hospital Bronx Division**	Bon Secours New York Health System (Schervier Nursing Care Center)
Inpatient pharmacy?	Yes	No	No	Yes--in-house pharmacy	No
Does SNF use dedicated pharmacy or contract with large/retail, or multiple pharmacies?	n/a	No	VNSNY does not own a skilled nursing facility.	See above.	Dedicated pharmacy
No. of Pharmacies -- outpatient	8	0	0	0	0
In-house laboratory?	Yes	No	No	No	No
How many outside laboratories?	4 major ones	3, but we primarily use the vendor that links to CIS.	3	Mt. Sinai Hospital	1
In-house radiology department?	Yes	No	No	No	No
How many outside radiology centers/ MR centers do you work with?	4 major ones	n/a	n/a	Health Trac, Montefiore hospital	1
Percentage of overall budget dedicated to IT?	<5%	2.2% of the home care budget is dedicated to IT.			
Electronic Health Record (EHR) system-- scheduling, billing, or claims?	Yes	EHR, Scheduling and billing is handled by MISYS. MISYS Healthcare Systems is one of the top HIT companies in North America, develops and supports reliable, easy-to-use software and services of exceptional quality that enable physicians and caregivers to more easily manage the complexities of health care. MISYS's clinical products incorporate web-based technologies and are designed from the ground up to share patient data across all medical care settings. The Homecare system can exchange data with hospitals and other systems.	Billing: The CHHA uses an internally developed billing system. Third-party software is used for hospice, the Medicaid Managed LTC (MLTC) plan, and a pediatric program. Third-Party Administrator is used for the new Medicare Advantage plan. Claims: For the MLTC plan, claims are done via internally developed systems but will shift to third-party software.	Site provided additional information in a separate document.	AHC is used for billing.

TABLE C.1 (continued)

Name of Health System	Montefiore Medical Center	Montefiore Home Health Agency (MHHA)	Visiting Nurse Service of New York (VNSNY)	Jewish Home and Hospital Bronx Division**	Bon Secours New York Health System (Schervier Nursing Care Center)
Clinical Electronic Health Record (EHR) system?	CareCast	MHHA uses MISYS Homecare software for our EHR. Clinicians in the field can instantly access health care plans, patient demographics, medications, and other clinical information to improve quality of care. OASIS collection is integrated into the patient health assessment. Assessments made on laptops at the point of care are remotely synchronized to our EHR in minutes. Field staff is required to sync their laptops a minimum of once every 24 hours.	VNSNY has developed an integrated EHR called the Patient Care Record System (PCRS), an accessible system via pen tablets by over 2,000 nursing and therapy staff.	Site provided additional information in a separate document.	No
Primary software vendor for electronic health information system (if applicable)	GE (IDX)-- CareCast	MHHA utilizes MISYS for our EHR. The software was externally developed and is one of the top three home care software packages in use today. The software is housed on a MS SQL Server.	The system is internally developed and supported. PCRS uses three-tier system architecture. The mobile component is written in MS VB 6 with a supporting MSDE/SQL database. Office-based functions are done by either using mainframe CICS/COBOL systems or on web-based Java applications. Data is synchronized between the mobile and host databases using internally developed store and forward processing via an intermediary RISC-based processor.	Site provided additional information in a separate document.	American Health Care
Short-term (6 months?) HIE* future plans	Many	MHHA projects included the expansion of our Web-based Physician Portal for orders. Implementing an interface between our Telehealth devices and MISYS to incorporate the data into our EHR. Developing an interface between MISYS and the hospital's EHR. Implemented auto-email to notify physicians when their patients are admitted to home care.	Planning for mobile-intake, MD web-based portal, RHIOs, and PCRS expansion to other clinical units, etc.	Participating in Bronx RHIO. We are developing a database to establish a unique identifier that will be the basis for sharing information within all JHHLS programs and services.	

TABLE C.1 (continued)

Name of Health System	Montefiore Medical Center	Montefiore Home Health Agency (MHHA)	Visiting Nurse Service of New York (VNSNY)	Jewish Home and Hospital Bronx Division**	Bon Secours New York Health System (Schervier Nursing Care Center)
Long-term HIE* future plans	Integrated expanded EMR spanning ambulatory, home health, and inpatient care, supported by online decision support.	MHHA will focus to ensure that 100% of all patient documentation will be captured in our EHR. MHHA will operationalize the HL7 interface to import information from referral sources automatically into MISYS.	Implementation of mobile-intake, MD web-based portal, RHIOs, and PCRS expansion to other clinical units, etc.		Electronic Medical Record
<p>* Information in this table was collected from a "General Information About Health Care Setting" form sent to all sites prior to the scheduled site visit.</p> <p>** A division of the Jewish Home and Hospital Lifecare System.</p>					

HEALTH INFORMATION EXCHANGE IN POST-ACUTE AND LONG-TERM CARE CASE STUDY FINDINGS

Files Available for This Report

Final Report

HTML: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase.htm>
PDF: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase.pdf>

Appendices

All Appendices

HTML: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-A.htm>

Appendix A: Draft Case Study Plan

HTML: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-A.htm#appendA>
PDF: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-A.pdf>

Appendix B: Site Visit Report--Erickson Retirement Communities, Catonsville, Maryland

HTML: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-A.htm#appendB>
PDF: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-B.pdf>

Appendix C: Site Visit Report--Montefiore Medical Center, Bronx, New York

HTML: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-A.htm#appendC>
PDF: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-C.pdf>

Appendix D: Site Visit Report--Intermountain Health Care, Salt Lake City, Utah

HTML: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-A.htm#appendD>
PDF: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-D.pdf>

Appendix E: Site Visit Report--Indiana Health Information Exchange, Indianapolis, Indiana

HTML: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-A.htm#appendE>
PDF: <http://aspe.hhs.gov/daltcp/reports/2007/HIEcase-E.pdf>