Final Report:

Recommendation for an
Electronic Medical Records System for the
Mount Sinai Adolescent Health Center

December 16, 2002

Presented by:
Heidi Bai
Wayne Li
Susan Tam
Charlotte Wang
# Table of Contents

I. Business Goals ........................................................................................................... 4

II. Requirements Specification ..................................................................................... 5

1. Summary ............................................................................................................... 5

2. Requirements Gathering Approach ................................................................... 5

3. Functional Requirements .................................................................................... 6

   A. Scheduling and Billing ...................................................................................... 6
   B. Data Elements .................................................................................................... 6
   C. Structure and Organization of Data ................................................................... 7
   D. Record Management / Data Import From External Sources............................. 7
   E. Patient Management Assistance ........................................................................ 7
   F. System Accessibility .......................................................................................... 7
   G. Accuracy And Integrity ...................................................................................... 8
   H. Data Export To Other Systems .......................................................................... 8
   I. Security / HIPAA compliance ............................................................................. 8
   J. Communication .................................................................................................. 8
   K. Transcription services ....................................................................................... 8
   L. Reports ............................................................................................................... 8
   M. Other Requirements .......................................................................................... 9

III. Adolescent Health Center – EMR Evaluation Project Plan .............................. 10

V. EMR System Evaluations ...................................................................... Error! Bookmark not defined.

   A. Logician........................................................................................................ 12
      Benefits ............................................................................................................ 12
      Drawbacks ....................................................................................................... 13
      Awards .............................................................................................................. 13

   B. Noteworthy EMR...................................................................................... 14
      Benefits ............................................................................................................ 14
      Drawbacks ....................................................................................................... 16
      Award ............................................................................................................... 17
      Cost of Implementation .................................................................................. 17

   C. PowerChart................................................................................................ 18
      Benefits ............................................................................................................ 18
      Drawbacks ....................................................................................................... 19
      Awards .............................................................................................................. 19

V. Product Evaluation Scoring ............................................................................. 20
I. Business Goals

The Adolescent Health Center (AHC), a non-profit organization, provides adolescents with confidential and comprehensive medical, mental health, family planning, and health education services. AHC is affiliated with the Mount Sinai Medical Center. Currently, the medical records at AHC are paper-based, and there are many drawbacks to this environment. At AHC, some daily challenges with paper-based records include:

- misplaced patient files
- limited storage capacity for clinical charts
- inability for simultaneous data access
- lack of reporting and research capabilities.

This goal of this project is to evaluate various electronic medical records systems (EMR) and make a recommendation based on AHC’s requirements. AHC would realize many benefits in implementing an electronic medical record system:

1. Improve the efficiency for health providers to review previous care events, to reach timely and appropriate clinical decisions, and to develop treatment plans that minimize the risks and maximize the potential benefits to the patient.

2. Electronic files can be readily accessed from anywhere, local or remote, across a communications link or network. Data that are stored in electronic formats can be retrieved electronically: literally billions of records can be sifted through in seconds if the database has been appropriately designed and indexed. More than one user at a time can have access to them, and all service providers can share the same records.

3. Once in electronic format, records can be reported upon automatically. Patients’ treatments can be assigned, statistical reports can be generated, automatic audit reports can be prepared, for example of caseloads, services provided, lengths of stay, costs of care and so on.

4. Provide material for research and data analysis to treatment of specific conditions or generate reports for funding sources.

5. Improve accuracy. Results and reports can be entered directly from other systems, eliminating the possibility of misfiling and of transcription errors.
(6) Store data in such a way as to ensure that the data are secure from loss, alteration or damage.

(7) Access controls that ensure patient privacy is adequately protected, and that the risk of disclosure to unauthorized persons is minimized.

(8) Records made by multiple providers in different locations and units can be linked and shared to create a single record for the individual. The problem of record fragmentation can be resolved, and patient care can be genuinely shared between providers.

(9) Save storage cost: Electronic storage of data is cheap and very compact.

(10) A more consistent approach in patient care, e.g. in patient evaluation, examinations, and results documentation.

II. Requirements Specification

1. Summary

We classified 12 key components for an electronic medical record system and developed a list of requirements. For the detailed list of requirements, refer to Appendix A. The list was reviewed with the AHC staff, and each requirement was categorized into 5 possible buckets:

- Essential
- Nonessential Presently But Essential In The Future
- Desirable
- For Future Consideration
- Out Of Scope/Not Needed

Due to confidentiality concerns, AHC eliminated those systems that are ASP-based (application service provider). The disadvantages of ASP model are as follows.

- ASP model allows access of medical record from outside locations with applications networking.
- System security is managed by the ASP provider.
- Data resides outside of AHC office and control.

2. Requirements Gathering Approach

A. We interviewed a variety of prospective users at AHC, including:
• a physician (Dr. Neal)
• a social worker (Mavis)
• the director of AHC’s mental care division (Dr. Dan Mendieros)
• practice managers (Jaime Huertas, Ruth Hoffman)
• the COO (Ken Peake)
• the CFO (Chris DiCarlo)
• a representative from Ryan White program

B. We gained an understanding of the data elements contained in a patient’s records and the current procedures of data population.

C. We gathered each representative’s specific requirements and expectations of the EMR system.

D. We identified special requirements, including specific reports the EMR should produce as well as security/privacy requirements.

E. We gained an understanding of the various levels of confidentiality related to patient data.

3. Functional Requirements

A. Scheduling and Billing

AHC currently uses the Cerner application to perform patient scheduling. They share a scheduling and billing system with the Mount Sinai Medical Center. Therefore, all functionality specific to scheduling and billing are outside of the scope of this project.

B. Data Elements

The efficiency of data input is essential to AHC.

Input into medical records is divided into "coded entry" and "free text". Coded entry indicates that the data is somewhat standardized. The advantage of this is that each element which is input into the database can be used for further searching and query functions. This broad database is useful for clinical research such as finding how many patients have a given condition or how many patients are on a certain medication. The downside of this type of input is that each of these input elements requires a "point/select/click" process which is time-consuming. One consideration in judging an EMR is by its "point/select/click" efficiency. That is, how many times do we have to point and click to get the document completed. Free text, on the other hand, has the advantage of easy, natural data input.
However, it is quite limited in database capabilities. Wherever possible, AHC would like to maximize the use of pick lists and check lists to ensure that data is valid and standardized.

C. Structure and Organization of Data

Most paper medical records have a "summary sheet" which contains pertinent patient data at a glance. In evaluating an EMR, a similar summary sheet is important. AHC would like the ability to see the relevant patient data “at a glance” rather than having to “point and click” on several places to obtain this information. It is essential to allow easy manipulation and updating of problem lists, medication lists and allergies.

D. Record Management / Data Import From External Sources

The system should have features such as electronically signing reports, including notes for visits and telephone conversations, laboratory data, ancillary studies, outside consultations and hospital discharge summaries. Numerous paper documents need to be scanned into the patient's chart, and multiple signatures are frequently required. The EMR should allow a reasonable and efficient way to review these documents. As a future consideration, AHC may want documents and lab results to be electronically transmitted and incorporated into the patient's chart via a standardized transfer protocol such as HL7.

E. Patient Management Assistance

The EMR should be able to trigger the need to fill out a new form after a set number of days, e.g. at AHC, a mental health patient is discharged after they do not show for 30 days. The system should also prompt for preventative maintenance, tracking, and patient reminders. Forms such as insurance, school, work excuse and referral letters should be supported.

F. System Accessibility

It is essential for the system to allow more than one user to access an individual record or record data element simultaneously, to allow access from more than one location or office, and to allow more than one record to be opened at a time. AHC estimates that it will need to deploy 60 workstations at AHC.
G. Accuracy And Integrity

Data accuracy and integrity is essential. i.e. real-time storage versus backup. A good disaster recovery plan is also necessary for the EMR.

H. Data Export To Other Systems

The EMR should support the HL7 data transfer protocol to allow for system to system communication. This is essential if AHC intends to connect the EMR with other systems in the future. To avoid duplicate patient setup in both the scheduling system and the EMR, AHC may want to implement a data link via HL7 so patient information can be automatically populated in the EMR. The ability to store documents as text or common word processor (Microsoft Word) files may be desirable, but not essential.

I. Security / HIPAA compliance

The EMR should enforce user authentication via user login ID’s and passwords. The system should allow different levels of access for different staff. To ensure patient security, a log of anyone who has viewed or modified the chart must be kept. Any modifications to a medical record must be traced. Each note, lab report, scanned document entered into the medical record must be signed by a physician. The system should support a function whereby the screen “goes blank” or automatically “logs-off” if no one is using the terminal to guard patient confidentiality.

J. Communication

Communication functions such as intra-office communication, email, fax from the EMR are not essential to AHC.

K. Transcription services

Voice recognition and dictation capabilities are desirable. In the future, AHC may want dictations to be downloaded directly into the medical record. This may help in practitioners complete medical updates more efficiently.

L. Reports
The EMR should support normalized data collection for reporting back to AHC’s funding agencies. The reports should provide statistical data at the program level, e.g.

- the number of monthly visits for CYP, Ryan White, etc.
- an unduplicated count of the number of patients in each program
- the number of new cases versus closed cases each month, etc.
- the number of counseling groups held

The system should also support data exports into Excel or Access for data analysis and ad-hoc reporting. Administrative and quality reports are also desirable, e.g. staff utilization, patient service times, staff workload, etc. If possible, the EMR should produce a quarterly demographic report on patients to replace the report that is currently generated by the scheduling system at AHC.

M. Other Requirements

- Need a flexible and extendable system that can be enriched over time.
- Need ability to track individuals who visit different medical/mental providers.
- Need ability to perform research work on data collected in EMR.
- Need the system’s uptime to support the operating hours at AHC.
### III. Adolescent Health Center – EMR Evaluation Project Plan

<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
<th>Finish</th>
<th>% Complete</th>
<th>Resource Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Consultation/Customization Services</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Bai,Tam</td>
</tr>
<tr>
<td>2</td>
<td>Software</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Bai,Tam</td>
</tr>
<tr>
<td>3</td>
<td>Hardware</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Bai,Tam</td>
</tr>
<tr>
<td>4</td>
<td>Database</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Bai,Tam</td>
</tr>
<tr>
<td>5</td>
<td>Support</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Bai,Tam</td>
</tr>
<tr>
<td>6</td>
<td>Deployment</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Bai,Tam</td>
</tr>
<tr>
<td>7</td>
<td>Understand Training Needs</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Li,Wang</td>
</tr>
<tr>
<td>8</td>
<td>Number of Stations</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Li,Wang</td>
</tr>
<tr>
<td>9</td>
<td>Number of Locations</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Li,Wang</td>
</tr>
<tr>
<td>10</td>
<td>Scanning Req for Conversion of Paper Records</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Li,Wang</td>
</tr>
<tr>
<td>11</td>
<td>Consultation/Customization Services</td>
<td>25 days</td>
<td>Mon 11/4/02</td>
<td>Fri 12/6/02</td>
<td>0%</td>
<td>Li,Wang</td>
</tr>
<tr>
<td>12</td>
<td>Final Recommendation to AHC/ Final Demo</td>
<td>9 days</td>
<td>Mon 12/9/02</td>
<td>Thu 12/19/02</td>
<td>0%</td>
<td>Bai,Li,Tam,Wang</td>
</tr>
<tr>
<td>13</td>
<td>Document Findings</td>
<td>5 days</td>
<td>Mon 12/9/02</td>
<td>Fri 12/13/02</td>
<td>0%</td>
<td>Bai,Li,Tam,Wang</td>
</tr>
<tr>
<td>14</td>
<td>Document Recommendation and Justification</td>
<td>5 days</td>
<td>Mon 12/9/02</td>
<td>Fri 12/13/02</td>
<td>0%</td>
<td>Bai,Li,Tam,Wang</td>
</tr>
<tr>
<td>15</td>
<td>Project Wrap Up</td>
<td>5 days</td>
<td>Mon 12/9/02</td>
<td>Fri 12/13/02</td>
<td>0%</td>
<td>AHC,NYU</td>
</tr>
<tr>
<td>16</td>
<td>Hold Project Demo on Dec 19</td>
<td>1 day</td>
<td>Thu 12/19/02</td>
<td>Thu 12/19/02</td>
<td>0%</td>
<td>Bai,Li,Tam,Wang</td>
</tr>
</tbody>
</table>
IV. EMR System Evaluations

There are 400 Electronic Medical Record systems on the marketplace today. Generally speaking, the EMR products can be categorized into two groups: pre-designed systems with minimum customization and mainly customized systems. While pre-designed systems tend to have a set of pre-defined functionalities, a customized system may cost anywhere from $1 to indefinite.

Due to considerations on sheer cost, system size, technology support and system security, we will focus primarily on pre-designed EMR systems with additional features being incorporated into the system as required. In order to narrow the long list of EMR systems, we used information gathered via:

- Interviews with AHC healthcare providers
- Gartner Research Data
- Direct discussions with Vendors
- Product information solicitation
- Further internet research
- Instructions from Professor Goldberg
- Visit other medical centers on their evaluation process

Basic product research and selection were performed on these 400 EMR systems, and further review and analysis were conducted on the 31 of them that meet requirement specifications satisfactorily at AHC. Extensive comparison on their strengths and weaknesses, pros and cons enabled us to derive a list of six systems that we decided to explore in depth.

We decided to invite three key EMR players among the six systems to hold product demos to the AHC management and system users:

<table>
<thead>
<tr>
<th>Application Name</th>
<th>Vendor Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logician</td>
<td>GE Medical System</td>
</tr>
<tr>
<td>Noteworthy</td>
<td>Noteworthy Medical Systems</td>
</tr>
<tr>
<td>PowerChart</td>
<td>Cerner Corporation</td>
</tr>
</tbody>
</table>

We evaluated these three EMR systems in detail to determine how it would fit with AHC’s requirements. We also viewed demos of each product to evaluate its functionality against other products. The following section provides a description of each system and outlines its benefits and drawbacks.
A. Logician

Logician, supported by GE Medical Systems, is one of the most widely used EMR products. Logician assisted healthcare providers to document patient cares, streamline clinic workflows, and exchange clinical data with other providers and information systems. Designed for the Windows environment to maximize customer familiarity, Logician system is relatively user-friendly and easy-to-navigate. GE Medical has a strong customer services team, which helps clients customize and maintain complete medical records by electronically storing and retrieving patients’ medical records with reasonable effort.

Benefits

1. HIPAA Compliance/Security

Logician has full functionality in security such as level of access, time stamp, system time out and electronic signature. It can set up different levels of access to ensure patient’s privacy. It also keeps detailed logs of anyone who has viewed or modified the medical record.

2. Support Standardized Transfer Protocols

Logician supports standardized transfer protocols such as HL 7, Active X, Andover Working Group, CCOW. Data can be transferred to other systems via standardized transfer protocol.

3. System Backup and Disaster Recovering

The Logician support team from MSNYU already designed a sound architecture regarding system backup and disaster recovery. The records will be backed up redundantly in 3 places, 2 in Manhattan and 1 in New Jersey. That will prevent disasters such as hardware failure, network interruption, and database corruption, fire, flood, or hardware sabotage.

4. Comprehensive Summary Sheet and Essential Health Care Functionality

Logician is designed by physicians for physicians. It provides full functionalities that fit health providers’ needs.

5. Clinical Decision Support Tools at the Point of Care

Logician has many clinical decision support tools such as medication checking, patient education handouts, and E&M advisor. The health care provider can use these supporting tools to reach good health care decisions.
6. Complete Implementation and Flexible Customization

The Logician technical supporting team from MSNYU will provide implementation and customization service for Logician EMR. The highly experienced team can provide very flexible customization such as flexible data entry tool and customized templates. The implementation usually takes 8-12 weeks to complete. They will also provide training to AHC.

7. Database Support

Logician works with Oracle 8i, which is currently used at Mount Sinai. This will save a lot of effort and costs in implementation.

8. Operating Systems Supported

Logician works with Windows 95/98/NT/2000, IBM AIX • HP/UX, which is what AHC currently uses for operation systems. That, too, will save a lot of resources during implementation.

9. System Reliability

According to the Logician support team from MSNYU, Logician is very reliable. The system uptime is very high and there are no major issues with the system.

Drawbacks

1. Logician cannot support direct lab results input from the lab system used by Mount Sinai. A custom interface would need to be built for this.

2. Logician cannot communicate directly with Cerner’s billing and scheduling system which is currently used by AHC.

Awards

1. STC (Society for Technical Communication) Willamette Valley Chapter Competition 2001-2002

   • Distinguished Award in Technical Publications Category
   • Excellence Award in Online Help Category

   (5.5 Logician Help & Logician Online Reference Library)

2. KLAS Presents The Fall 2001 Performance Awards

   The Fall 2001 Healthcare I.T. Performance Report is out with its Top 20 rankings.
• Marathoner: To GE Logician (from MedicaLogic), for rating in the top five for three years but never getting the top award. This year, Logician got second place.

• Best Buy: To GE, for its purchase of two of KLAS highly rated products, iPath and Logician.

• For Overall Rankings: #3

• For Ambulatory Clinical EMR & Charting: #2

3. Rating by Family Practice Management

• General design (****)
• Functionality for health care provider(*****)
• Functionality for patient(*****)
• Overall score(****)

(Note: ***** means more than 90 percent of the important functionality 
  **** means 76 percent to 90 percent of the important functionality)

4. Third party report

• Virginia University’s study (Study of 16 clinics using Logician for more than one year)

  - Improved record quality: 82%
  - Improved patient care quality: 77%
  - Improved service quality: 74%
  - Improved quality of work life: 63%
  - Improved administrative efficiency: 62%
  - Patient perception positive: 7: 1

B. Noteworthy EMR

Working closely with physicians, practice managers and other health care providers, Noteworthy Medical Systems designed Noteworthy EMR, a point of care electronic medical record (EMR) system that is easy to use and flexible leading to its highly intuitive "3 Screens" approach (Patient Summary, History and Physical, and Order Entry). Noteworthy EMR was designed to serve multiple specialties in medium to large group practices, teaching institutions, outpatient hospital facilities and integrated delivery networks.

Benefits

1. Improves quality of care
Noteworthy system establishes uniform visit outlines for every patient and computer-prompted questions ensure that all necessary information is recorded. When physicians enter the prescription, system will automatically check for drug interactions.

2. Enriches data reports and analysis

Because of the system’s structured data, information in the medical records can be used to create virtually an unlimited array of reports and analysis. It is simple and efficient to create a practice analysis by diagnosis, physician or time. Noteworthy can also analyze demographic trend, prescribing patterns, billing trends, or reimbursement records by individual physician or the group. Physician can even customize the report template.

3. Improves physician organization and communications

When the physician logs into the system, the system will pop up a daily to do list for the physician and this list will be updated as items are completed. The system can generate customized referral letters and organize patient data into printable soap notes for reference or referral.

4. Secures Data Storage and Transmission

Noteworthy’s password system and modification record within each patient record allows access history to be readily available and documented. The customer can determine the access level for personnel in the practice.

5. Strengthens HIPAA Compliance

Noteworthy uses standardized data fields that are in compliance with HIPAA to record patient information. With built-in HL7 interface, the industry standard, Noteworthy can provide total integration with existing administrative and clinical systems. After integration with existing billing system, Noteworthy can create standardized claims and bills.

6. Enables customer to benefit from their strategic partners

- **3M**: Noteworthy integrates the 3M Healthcare Data Dictionary, 3M Clinical Data Repository, and 3M Electronic Master Patient Index (EMPI) with its
Noteworthy EMR.

- **AIC**: Noteworthy has an add-on module of IMPACT.MDÔ, developed by Advanced Imaging Concepts, Inc. (AIC), for clinical practices who want completely paperless offices. IMPACT.MD, is a high-speed medical document imaging solution that serves as a single, flexible repository for all of the patient-related paper that flows around the office, whether it is generated from within the office, such as office notes, or outside the office, such as lab results and referral letters. Patient files are located instantly, eliminating searches for lost charts.

- **First Data Bank**: First Data Bank provides comprehensive electronic drug, medical and nutrition knowledge bases for the healthcare industry. First Data Bank combines the proven drug information of their National Drug Data File®, with their clinical support modules—to deliver complete clinical, descriptive and pricing information for every drug approved by the FDA. Noteworthy Medical Systems receives monthly updates from First Data Bank, which are in turn provided to their clients at their convenience.

- **Park City Solutions**: Noteworthy has a built-in interface provided by Park City Solutions and through that interface to directly connect with all the lab systems partnered with Park City Solutions, or Park City Solution will build up bi-directional lab interface. Lab system partnered with Park City Solution include: IDX, Cerner, HBOC, Sunquest, STC, SMS, Healthcare.com, Eclypsis, DHT

- **HyperCereus**: HyperCereus provides all medical necessity Medicare Part A and Part B content for Noteworthy EMR. Powered by HyperCereus’ data sets, Noteworthy EMR provides coding and medical necessity compliance checks at the point-of-care, facilitating more accurate and complete documentation improving reimbursement levels.

**Drawbacks**

1. **Limited Text Edit Functionality**

   The system utilized templates extensively. The screens are 90% template driven to provide convenience to the physicians. As a result, one of the drawbacks is it may not have enough text edit functionality, which is quite essential for mental health
division of AHC as each patient has his or her own unique story. The sales representative confirmed that Noteworthy can simply add a letter writer template so the Physicians can key in specific notes, but the performance can not be evaluated.

2. Specified Database Server

Currently Noteworthy EMR only supports the Microsoft SQL Server 2000 as its Relational Database Management System (RDMS). While SQL Server is a robust and proven product, many big user organizations prefer Oracle in the ambulatory environment.

3. Relatively Small EMR User Base

While the customer base has grown year over year, Noteworthy is still a young and smaller company with few customers than its larger competitors in the EMR market. It has only a couple of institution-sized customers now.

4. No Wireless Application

None of the systems Noteworthy sells are wireless. Noteworthy believes the price difference between a desktop computer and a top-end $4,200 Fujitsu may be minimal in a one- or two-doctor office, but it is "staggering" when multiplied out over hundreds of users at a clinic or hospital who are their major target customers.

Award

- **2000 NorTech Innovation Award Winner**
  
  In recognition of Noteworthy's position as a pioneer, the company was selected as one of 25 recipients of the 2000 NorTech Innovation Award.

- **2002 Pioneer Award**
  
  Noteworthy Medical Systems, Inc.

- **The 2002 Clinical Documentation Challenge**
  
  Noteworthy won top honors at the 18th Annual TEPR Conference's Clinical Documentation Challenge, held on May 14, 2002.

Cost of Implementation
1) Software          License fee = $10,000 per Physicians
2) Implementation      Customization fee = $190 per hour
3) Hardware
   • One database server
   • One file server
   • One application server
   • One interface server (The existing server best fit into interface server)
   • Personal Computers
   • Network connection
4) Database          License fee of Microsoft SQL 2000
5) IT personnel    One full time employee
6) Maintenance  18% of license fee per year

C. **PowerChart**

PowerChart is a suite of healthcare solutions designed by Cerner to combine all the essential elements of the EMR into a single system. This system streamlines the workflow process into one desktop application that provides access to the functions that support the electronic medical record. While designed primarily for enterprise-wide, multi-facility and multi-entity medical organizations, PowerChart helps healthcare to integrate clinical information from multiple locations and permit instant access to longitudinal patient information, thereby substantially improving efficiency and immediacy of care.

**Benefits**

1. **Intuitive Patient Data Input**

PowerChart is a rather user-friendly system. It integrates medical and mental care into a drop-down template format and includes both coded entry and free text input on these templates. Healthcare providers can, therefore, follow the recording procedure intuitively and enter patient information into the system.

2. **Interface with Foreign Systems**

Thanks to the connections PowerChart has to a wide range of result data and documents from interfaced foreign systems, including such as Laboratory, Radiology, or Pharmacy. Patient data become immediately actionable across the entire medical center, and associated tasks can be automatically notified.

3. **Information Standardization**
The standardization on patient information substantively eases the way for menu navigation, information transfer, report generation and research data collection.

**Drawbacks**

(Since the PowerChart demo is scheduled for Dec 19, the description on PowerChart system benefits and drawbacks is not yet available and these sections will be enhanced after the demo.)

**Awards**

Ever since its founding in 1979, Cerner has been a pioneer in automating healthcare services, eliminating avoidable medical errors and helping medical organizations to deliver better quality care at higher efficiency and reduced cost. Cerner’s achievements have won various awards internationally, nationally and locally for its suite of products, notably PowerChart.

Awards won in 2002:

• Fortune “100 Best Companies to work for in America” – Cerner Corporation
• Business Attraction and Expansion Award – Cerner Corporation
• International Design Magazine’s Annual Design Award - PowerChart
• Society of Environmental Graphic Merit Award – PowerChart
• 2002 Governor’s Achievement Award – PowerChart

Awards won in 2001

• Fortune “100 Best Companies to work for in America” – Cerner Corporation
• #86 on Forbes Top 100 Best Small Businesses – Cerner Corporation
• Business Week “100 Best Small Corporations – Cerner Corporation
• Business Week #10 IT Infrastructure – PowerChart
• #7 on Healthcare Informatics Top 100 IT Systems - PowerChart
• Young Architects Award – PowerChart

Awards won in 2000

• Fortune “100 Best Companies to work for in America” – Cerner Corporation
• Deloitte & Touché Technology Fast 50 Award – PowerChart
V. Product Evaluation Scoring

The following matrix outlines the requirements gathered from AHC. Each requirement was categorized into one of five buckets as defined below. In addition, each product was evaluated based on a scoring scale in terms of how well it met the specified functionality.

**Category Definition**

<table>
<thead>
<tr>
<th>Category Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 – essential</td>
</tr>
<tr>
<td>4 – non essential presently but essential in the future</td>
</tr>
<tr>
<td>3 – desirable</td>
</tr>
<tr>
<td>2 – for future consideration</td>
</tr>
<tr>
<td>1 – out of scope / not needed</td>
</tr>
</tbody>
</table>

**Scoring Scale:**

1 \[\rightarrow\] 5 \[\rightarrow\] 9

Did Not Meet Requirements | Satisfactorily Meets Requirements | Meets Requirements | Perfectly

### AHC Electronic Medical Records System Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Category</th>
<th>Score &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scheduling:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the system allow for scheduling patients, scheduling multiple physicians and nurse practitioners, callbacks, physicians scheduling, intraoffice communication?</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Logician has scheduling function, but AHC will not use it for now.</td>
</tr>
<tr>
<td>Can multiple physicians schedules be called up on the same screen?</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In patient Summary screen</td>
</tr>
<tr>
<td>Question</td>
<td>Rating</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Does the system provide patient reminders which can be mailed to the patient for scheduled follow-up appointments?</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Are the reminders based on previously designed treatment plans, treatment protocols for preventive services?</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td><strong>Data Elements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input in medical records is divided into &quot;coded entry&quot; and &quot;free text&quot;. Each CODED element which is input into the database can be used for further searching and query functions. What fields are coded versus free text? How are the codes used, e.g. for rep...</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>The downside of this type of input is that each of these input elements requires a &quot;point/select/click&quot; process which is time-consuming. Look at each EMR and judge it by its &quot;point/select/click&quot; efficiency.</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Maximize use of pick lists to ensure that data is valid and standardized.</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Capability for developing custom data entry forms (by AHC staff)</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td><strong>Structure and Organization of Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are summary sheets supported? Can you see the relevant patient data &quot;at a glance&quot;, or do you have to &quot;point and click&quot; on several places to obtain this information?</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Does it allow easy manipulation and updating of problem lists, medication lists and allergies?</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td><strong>Record management / Data import from the external sources:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the system allow for results reporting features such as electronically signing reports, e.g. multiple signatures required per form at AHC,</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>

Electronic signature will not
including notes for visits and telephone conversations, laboratory data, ancillary studies, outside consultation

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating</th>
<th>Rating</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the system allow for numerous paper documents or lab results to be scanned into the patient's chart?</td>
<td>5</td>
<td>5</td>
<td>Built-in module to repository paper files</td>
</tr>
<tr>
<td>Is there a reasonable and efficient way to review these documents?</td>
<td>5</td>
<td>5</td>
<td>Click patient datasheet</td>
</tr>
<tr>
<td>Does it allow documents and lab values to be electronically transmitted and incorporated into the patient's chart via a standardized transfer protocol such as HL7?</td>
<td>5</td>
<td>5</td>
<td>Through interface of Park City Solutions</td>
</tr>
<tr>
<td>Since the physician is responsible for each of the documents in the chart, is there a way to electronically sign each of these documents imported?</td>
<td>5</td>
<td>9</td>
<td>Communication with other systems is facilitated.</td>
</tr>
</tbody>
</table>

**Patient management assistance:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating</th>
<th>Rating</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a prompt for preventative maintenance, tracking and patient reminders?</td>
<td>4</td>
<td>5</td>
<td>Summary screen keep the due date</td>
</tr>
<tr>
<td>Is there a way to trigger the need to fill out a new form after a set number of days, e.g. at AHC, a mental health patient is discharged after they do not show for 30 days.</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Does it have the ability to modify these algorithms by individual practitioner (a practitioner may believe in yearly mammography while his associates may have different opinions)?</td>
<td>1</td>
<td>3</td>
<td>Change the treatment plan</td>
</tr>
<tr>
<td>Does it allow support forms such as insurance, school, work excuse and referral letters?</td>
<td>4</td>
<td>7</td>
<td>SOAP</td>
</tr>
</tbody>
</table>

**Accessibility**

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating</th>
<th>Rating</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the system allow more than one user to access an individual record or record data element simultaneously?</td>
<td>5</td>
<td>9</td>
<td>Logician allows up to 15 users use the same record.</td>
</tr>
<tr>
<td>Does it allow access from more than one location?</td>
<td>4</td>
<td>9</td>
<td>Noteworthy clinical companion</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Does it allow access from more than one office?</td>
<td>4</td>
<td>9</td>
<td>Noteworthy companion</td>
</tr>
</tbody>
</table>

**Accuracy and integrity**

<table>
<thead>
<tr>
<th>What mechanisms are in place to maintain database integrity? I.e. redundant real-time storage versus backup.</th>
<th>5</th>
<th>9</th>
<th>The record will be backed up redundantly in 3 places.</th>
<th>1</th>
<th>Patient data stored on ASP Mode.</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is in place to support disaster recovery?</td>
<td>5</td>
<td>9</td>
<td>Architecture is up to customer</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>What is in place to support automatic archiving of records, or purging records into storage based on a set of criteria, e.g. patient is over the age of 21 and is no longer serviced at AHC.</td>
<td>3</td>
<td>7</td>
<td>as above</td>
<td>3</td>
<td>Available at request.</td>
</tr>
<tr>
<td>The system must have a track record of high reliability, hopefully on the order of at most a couple of hours of downtime per year.</td>
<td>5</td>
<td>9</td>
<td>Logician is highly reliable.</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Data export to other systems**

<table>
<thead>
<tr>
<th>Can your current data be transferred to the new system via a standardized transfer protocol such as HL7? Does the new system support HL7?</th>
<th>4</th>
<th>9</th>
<th>Logician support HL7</th>
<th>9</th>
<th>Built-in HL7 interface</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to export to excel or access or other database or data analysis tool like SAS/SPSS for data analysis and ad hoc reporting.</td>
<td>5</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are your documents stored as text or common word processor (Microsoft Word) files so that they can be easily retrieved?</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Security / HIPAA compliance**

<p>| Enforce user authentication with login Ids and passwords. | 5 | 9 | Logician supports many | 9 | Different features on ensuring | 7 |</p>
<table>
<thead>
<tr>
<th><strong>Firewall between medical records and &quot;classified&quot; records</strong></th>
<th>5</th>
<th>9</th>
<th>7</th>
<th>Available at request.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Different levels of access for different staff. This needs to occur at the &quot;per form&quot; level.</td>
<td>5</td>
<td>9</td>
<td>It can set up different levels of access to ensure patient’s privacy.</td>
<td>9</td>
</tr>
<tr>
<td>To ensure patient security, a log of anyone who has viewed or modified the chart must be kept. Any modifications of a medical record must be traced. Each note, lab report, scanned document entered into the medical record must be signed by a physician.</td>
<td>5</td>
<td>9</td>
<td>It keeps detail log of anyone who has viewed or modified the medical record</td>
<td>9</td>
</tr>
<tr>
<td>Need system to &quot;go blank&quot; if no one is using the terminal to guard patient confidentiality.</td>
<td>5</td>
<td>9</td>
<td>Logician has system time out feature.</td>
<td>9</td>
</tr>
</tbody>
</table>

**Communication**

<table>
<thead>
<tr>
<th>Is there a secure way to fax, mail, e-mail a recently completed note to other physicians who are involved in the care of the patient?</th>
<th>1</th>
<th>7</th>
<th>9</th>
<th>Various methods available to transfer patient data.</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a way to &quot;copy the chart&quot; into paper documents for outside consultation?</td>
<td>1</td>
<td>7</td>
<td>9</td>
<td>SOAP notes</td>
<td>3</td>
</tr>
<tr>
<td>Does the software allow for intraoffice communication?</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>not supported</td>
<td>9</td>
</tr>
</tbody>
</table>

**Transcription services:**

| Voice recognition is just beginning to become acceptable with the newer version of DragonDictate and a fast machine dedicated to dictation. | 3 | 7 | 1 | Not yet supported. | 1 |
Can dictations be downloaded directly into the medical record. While many systems offer template driven documents, may find that the output from these documents is too structured and mechanical looking to serve our needs.

Other Requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Rating</th>
<th>Priority</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient educational material</td>
<td>2</td>
<td>9</td>
<td>9 Available at request.</td>
</tr>
<tr>
<td>Access to web based patient information,</td>
<td>1</td>
<td>1</td>
<td>5 Need customization A basic feature of the system.</td>
</tr>
<tr>
<td>Patient access to their own information,</td>
<td>1</td>
<td>1</td>
<td>5 Need customization</td>
</tr>
<tr>
<td>Administrative and quality reports based on demographic data, disease states and other variables, provider productivity, provider utilization of diagnostic tests, medications, etc.</td>
<td>4</td>
<td>7</td>
<td>9 See sample report Available at request.</td>
</tr>
<tr>
<td>Data collection for reporting into funding agencies. Having the patient medical record trigger specific statistics for reporting purposes, eg. CYP, Ryan White.</td>
<td>5</td>
<td>7</td>
<td>9 See sample report</td>
</tr>
<tr>
<td>Need a flexible and extendable system that can be enriched over time</td>
<td>5</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Need ability to track &quot;groups&quot; held for stats reporting.</td>
<td>5</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Need ability to produce an &quot;unduplicated count&quot; of the number of patients seen in each program per month.</td>
<td>5</td>
<td>7</td>
<td>9 See sample report Available at request.</td>
</tr>
<tr>
<td>There are other stats that must be manually tracked at AHC. This is the right side of the stats form. How can the EMRS support this functionality?</td>
<td>3</td>
<td>7</td>
<td>9 Scan the original form into html but donot input data on right side</td>
</tr>
</tbody>
</table>
VI. Comparison Summary:

<table>
<thead>
<tr>
<th>Critical Requirement</th>
<th>Weight</th>
<th>Logician</th>
<th>Noteworthy</th>
<th>PowerChart</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Ease of Use / Workflow Efficiency</td>
<td>5</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>2) Data Imports &amp; Exports</td>
<td>5</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>3) System Reliability</td>
<td>5</td>
<td>9</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4) HIPAA Compliance</td>
<td>5</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>5) System Security</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>6) Overall Functionality</td>
<td>4</td>
<td>8</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>7) Reports / Ad Hoc Queries</td>
<td>4</td>
<td>8</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>8) Data Collection for Research</td>
<td>3</td>
<td>8</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>9) Customizable / Extensible</td>
<td>4</td>
<td>9</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>10) Mental Health Functionality</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>11) User Interface</td>
<td>4</td>
<td>8</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>12) Ease of Implementation</td>
<td>4</td>
<td>8</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>13) Connectivity to Billing,</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Scheduling, and Lab Systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14) Distinguished Awards</td>
<td>3</td>
<td>9</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>15) Vendor Market Share</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>16) Vendor Reputation / Customer Service</td>
<td>3</td>
<td>8</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>17) Total Products Cost</td>
<td>4</td>
<td>9</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

**Total Score** $\sum$

Notes:

(a) The weighting placed on each critical requirement was derived from discussions with the AHC team and follows the scale shown for “Category Definition” shown above.

(b) A 1 to 9 scale is adopted to rate each of the three systems. See scale definition shown above.

(c) Total Score $\sum$ is calculated using the formula:

$$\sum = \text{Score of Each Item} \times \text{Importance Weight on Each Requirement}$$

(d) PowerChart rankings are pending Dec 19 demo. Totals to be calculated at that time.
VII. Final Recommendation

In the course of evaluating EMR products, we learned that AHC would be able to receive Logician from Mount Sinai at essentially no cost. This deal was difficult to beat and raised the bar for other EMRs we were evaluating. They had to be exceptionally better than Logician to justify the cost, which was unlikely given that Logician is one of the market leaders. However, we reviewed a few more EMRs for due diligence.

In the end, we feel that the Logician product is best suited to the needs of AHC. As the above matrix shows, it meets all of AHC’s critical criteria and in most cases did a better job at it than competitors. One very important factor was the level of customizability in Logician, and thus, it’s ability to support the mental health practice. With Logician, you can design any type of template to meet your needs, and there is no limit on the number of data elements available to track all the data that you need. This is especially beneficial for research and reporting purposes. Lastly, the ability to customize reports or to run ad hoc queries via the back end gives AHC the flexibility to utilize the system as its reporting needs change. The complex and changing reports at AHC that are needed for funding agencies or demographic reporting can be generated automatically instead of manually. Clearly, Logician scored the highest overall.

VII. Deployment Plan

Recommended Deployment Strategy

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Create Project Team with Key AHC and IT Representatives</td>
</tr>
<tr>
<td>2)</td>
<td>Assess Project Scope</td>
</tr>
<tr>
<td>3)</td>
<td>Assess Technical Environment at AHC</td>
</tr>
<tr>
<td>4)</td>
<td>Purchase Hardware Equipment Required</td>
</tr>
<tr>
<td>5)</td>
<td>Install Hardware (Computers and Internet Connections)</td>
</tr>
<tr>
<td>6)</td>
<td>Install Logician Software</td>
</tr>
<tr>
<td>7)</td>
<td>Test Connectivity to Mount Sinai Servers</td>
</tr>
<tr>
<td>8)</td>
<td>Establish / Test Back-Up Recovery Plan Process and Sign off</td>
</tr>
<tr>
<td>9)</td>
<td>Design and Configure Logician – System Customization</td>
</tr>
<tr>
<td></td>
<td>a) Make Decisions on Clinical Content Setup</td>
</tr>
<tr>
<td></td>
<td>b) Build Customized Screens / Templates</td>
</tr>
<tr>
<td></td>
<td>c) Define Clinical Data for EMR Chart</td>
</tr>
<tr>
<td></td>
<td>d) Implement Required Interfaces</td>
</tr>
</tbody>
</table>
IX. Estimated Logician Implementation Costs

Since AHC is a part of Mount Sinai Hospital, AHC is able to receive many components of the Logician implementation for free. These include costs pertaining to the Logician software, database licensing costs, consulting and training time, as well as ongoing support and maintenance.

AHC will be able to leverage the existing infrastructure that is already in place at Mount Sinai, such as the production EMR server, disaster recovery set-up, partitioned database, etc. Since Mount Sinai has a database license already in place for Logician, there is no additional cost to AHC. The Mount Sinai IT department would provide services to AHC at no cost, such as consulting/training, implementation, support and maintenance, as well as database administration.

If AHC decides to proceed with Logician, the implementation costs would be minimal due to the special arrangement with Mount Sinai. The cost breakdown is as follows:

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Software</td>
<td>$ 0</td>
</tr>
<tr>
<td>2) Hardware</td>
<td>$ 52,400</td>
</tr>
<tr>
<td>3) Database</td>
<td>$ 0</td>
</tr>
<tr>
<td>4) Consulting / Training</td>
<td>$ 0</td>
</tr>
<tr>
<td>5) Support and Maintenance</td>
<td>$ 0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$ 52,400</strong></td>
</tr>
</tbody>
</table>

X. Hardware Cost Calculation

AHC staff would access the Logician system via a secure internet connection. The Logician servers and databases are located at Mount Sinai Data Center. Thus, the
computers needed to run Logician have minimal requirements. To run Logician with Mount Sinai’s ASP model, the PC can run any version of Windows and must have a connection to the internet. The software required on the client PC is minimal, less that 50MB of free disk space is required. There is no processor or memory requirement.

We performed a preliminary hardware assessment at AHC. AHC currently has approximately 80 computers, all of which are less than 5 years old. The majority of these PC’s should meet the requirements to run Logician, however, we have decided to take a conservative approach in cost estimation and assume that roughly half of these computers will need to be replaced:

**Personal Computers Calculation:**
Assuming 40 PC’s need to be replaced at $1,200 per PC (includes monitor)
40 Computers * $1,200 per Computer = $48,000

Note: The $1,200 cost per PC is based on the approximate purchase price that AHC has purchased computers at in the past.

**Internet Connections:**
AHC has approximately 11 patient examination rooms that require installation for internet access. The other rooms at AHC including offices already have internet access currently. The Mount Sinai IT Department estimates that each connection would cost around $300 - $500.

Using the average price of $400 per internet connection, we get:
11 connections * $400 per Connection = $4,400

*Total Hardware Cost = $48,000 + $4,400 = $52,400
Once the EMR is implemented, AHC’s daily operations will be completely dependent on it. In order to minimize disruptions or problems with system accessibility and uptime, a reliable infrastructure is critical.

AHC would connect to Logician via internet connection. The server and databases are located at the Mount Sinai Data Center. The access which is through a virtual private network (VPN) is secure and reliable. There is one consolidated Logician database that all Mount Sinai areas used, but each area’s data is partitioned in the database. Therefore, AHC would receive its own database partition.

Since the Logician system is a client / server software, AHC will connect to the server at Mount Sinai using a meta-frame / Citrix connection. This allows the hardware requirements on the client to be minimal and light. This set-up resembles an ASP (application service provider) model, however, in this case, the service provider is Mount Sinai, and not an external entity.

While AHC had previously expressed some concerns over using an ASP-based model for its EMR system, this model is acceptable because the data and control are still housed internally. Patient confidentiality and security remain in the control of Mount Sinai / AHC.
XII. Disaster Recovery (DR) Model

It is important to have contingency plans in the event that the Logician system goes down or is not accessible. Patients still need to be seen, treated and helped in a timely manner.

Mount Sinai has implemented a robust disaster recovery model. The following lists the various servers dedicated to Logician continuity:

<table>
<thead>
<tr>
<th>Server</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Server</td>
<td>Midtown Manhattan, Madison Ave.</td>
</tr>
<tr>
<td>1 Hot Standby Server</td>
<td>Midtown Manhattan, Madison Ave.</td>
</tr>
<tr>
<td>2 DR Servers</td>
<td>NYU Health</td>
</tr>
<tr>
<td>2 DR Servers</td>
<td>New Jersey (will be in place soon)</td>
</tr>
</tbody>
</table>

The Logician database is backed-up each night on tape. During the backup, the system is down from 2am to 4am. The system is up all other times of the day.

In the event that AHC loses internet connectivity or system accessibility, there are various approaches to ensure operational continuity:

- A DSL line can be used if the internet connection is down,
- The Mount Sinai Support Team can print paper charts for those patients who have appointments that day. Doctor notes would need to be tracked on paper until the EMR system is back up.
- The Mount Sinai Support Team can print charts to a pdf file and provide to AHC. Doctor notes would need to be tracked on paper until the EMR system is back up.

XIII. Future of Cerner’s PowerChart at Mount Sinai

Based on discussions with AHC and Mount Sinai, we understand that there is a possibility that Mount Sinai may decide to replace the Logician EMR system with PowerChart EMR. A pilot is being conducted currently with the IMA (Internal Medicine) clinic of Mount Sinai.

Some advantages of PowerChart that make it appealing for Mount Sinai and AHC are:

- PowerChart will be able to interface directly with the Billing and Scheduling system that is used. This system is also from Cerner so a plug in interface is readily available.
- PowerChart has an interface with the Lab System that Mount Sinai / AHC uses, so lab results could be electronically transmitted and loaded between the two
systems. This would eliminate the current reliance on postal mail to communicate lab results, which improves efficiency, cost, and the matter of patient confidentiality.

If Mount Sinai goes to PowerChart, the system architecture will be the same as that of Logician. That is, PowerChart would be available to AHC via internet connection. The servers and databases would be housed at Mount Sinai. The cost model and support model would be exactly the same.

**PowerChart Demo**

We have arranged for a demo to be held at AHC of the PowerChart product on Dec 19, 2002 at 1pm. We will gain a clearer idea of the system and its functionality at that time and will be able to compare it against the Logician product.

**XIV. Risk and Open Issues**

The shift from paper to electronic medical record system will facilitate great improvements in medical care. At the same time this shift may raise a few open issues that must be considered:

1. **Identification and authentication of system users**
   
   Even though the system will require a user name and password for authentication, it is difficult for it to detect fraudulent users who have somehow secured valid user information.

2. **Staff Resistance**

   As the new system will significantly change the current workflows, it may bring about some resistance from staff. Detailed training to help most staff with this shift might become very important, so the risk of human error can be minimized and the changes can be made less daunting.

3. **Protection of Confidential Information**

   The ease with which computerized records can be copied and communicated makes the task of preserving medical privacy very difficult. It’s getting worse when third party financing agents, such as insurance firms and self-insuring firms, have access to patient medical records. The financing agents, frequently businessmen and women without medical training, have discretion over the prescribed procedures.

4. **System Connection**

   ...
With a backup server working at the same time with the server, it decreases the system down rate, but there is still an unavoidably potential risk there.

4. **Administrator Security**

As the Database Administrator (DBA) has the super right to access everything in the database, the failure of DBA might be disastrous to the whole system. For AHC, after installing the system, hiring a good DBA will become a critical issue.

**Appendix A**

**Use Cases for the Electronic Medical Records System**

1. **View Patient’s Record**

1) Physician enters patient ID# into EMR.
2) EMR verifies that physician has proper access privileges to view requested record.
3) EMR displays patient record.
4) Physician scrolls to the medication list in patient’s record.
5) Physician exits EMR.
6) EMR logs that physician has viewed the record and has not made any updates to it.

2. **New Patient Examination**

1) Registrar enters patient data into EMR.
2) EMR generates unique admission #.
3) Physician enters patient medical history into EMR (checklist).
4) Physician adds assessments (free text).
5) Physician opens CYP case.
6) System updates statistics for new CYP patient.
7) Physician saves and exits the patient record.