Metropolitan Nashville General Hospital

INFORMATION SYSTEMS PLAN

August, 2000

MNGH INFORMATION SYSTEMS PLAN - 2000

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Introduction

Metropolitan Nashville General Hospital is a 150-bed (127-operated) acute care public facility. It offers medical and surgical facilities, including critical care and outpatient surgery, emergency services, a maternal and infant care clinic located in the Meharry Ambulatory Care Center (MACC), an off-site primary care clinic located approximately 4 miles away, and a facility for treating Metro employees injured on the job (MIOD Clinic) on-site. The hospital also operates a school of radiologic technology on-site.

Metropolitan Nashville General Hospital (MNGH) is operated by a Hospital Authority – a cooperative arrangement between Meharry Medical College, Vanderbilt University and the Nashville-Davidson County Metropolitan Government. Through this cooperative arrangement, senior management is provided by Vanderbilt University, contracted physician services are provided by Meharry Medical College, and residents from both Vanderbilt and Meharry Medical Schools rotate through various MNGH hospital departments. This collaboration compels the information systems activities to not only support the patient care needs of MNGH, but also to support the educational and research interests of all associated entities.

Mission of the Information Systems Department

DEPARTMENTAL MISSION STATEMENT:

The Information Systems Department will assist the mission of the hospital by:
- providing, maintaining, and securing information to improve individual and organizational performance, patient care, management and support functions;
- assessing and responding to the information needs of the organization;
- promoting and assisting with the use of technology to improve organizational efficiency, information accuracy, and compliance;
- providing expertise for assessing and implementing information systems and technology projects supporting the strategic direction of the organization.

DEPARTMENTAL GOALS & OBJECTIVES:
(as related to the achievement of the Hospital's 5 Strategic Goals)

1. **Improve margin by controlling expenses**.
   A detailed review of current I.S. contracts will be conducted to look for opportunities for savings. Other I.S. efforts will focus on streamlining processes, increased standardization, promoting accurate and timely charge entry into all systems, making other departments more efficient through improved use of technology and economies of scale, eliminating compensated overtime by salaried I.S. staff.

2. **Improve internal business operations and processes**.
   Improve hospital-wide knowledge and use of information systems. Look for opportunities to automate current manual processes. Provide management reports to departments. Improve continuity of care by improving physician access to patient data. Improve access to transcribed reports to eliminate pulling charts and faxing. Increase ability of reports to be printed "on demand" in each unit, rather than centrally and then distributed. Upgrade the Affinity server and bring it in-house. Control and decrease system downtime.

3. **Enhance customer-centered philosophy and improved service**.
   Improve I.S. communications with users. Develop regular surveys and user forums for I.S. issues. Encourage teamwork within the department through regular team meetings and group initiatives. Increase emphasis on customer service in performance reviews.

4. **Develop a learning/growth environment**.
   Provide increased training to staff. Increase users' knowledge of systems throughout the organization. Improve morale within department by re-evaluating job descriptions, providing more equitable wages, and providing increased opportunities for advancement. Increase written documentation of IS processes and increased cross-training of staff.

5. **Organizational compliance**.
   Provide leadership on information security efforts and HIPAA compliance initiatives. Develop a program to educate users of security, patient privacy/confidentiality, and HIPAA standards. Develop and maintain processes that meet or exceed JCAHO standards. Institute quality management and monitoring programs for I.S. processes.

IS Department Overview

IS OPERATIONS:

The Information Systems Department is comprised of 10 full-time equivalent (FTE) employees. The departmental organizational structure is shown on the following page. Occasional part-time staff, in the form of volunteers and/or students, are utilized to supplement regular staff, when available. Currently the hours of operation of the department are 8am–4:30pm Monday-Friday. The night shift (approximately 10pm-8am, everyday) consists of a single computer operator. Periods of only on-call coverage (for example, 4:30pm-10pm) exist. We are looking to stagger work schedules so that we may increase on-site coverage to 24 hours/day, 7 days/week. Management and supervision is provided by two mid-level IS managers, the IS department Director, and hospital CFO.
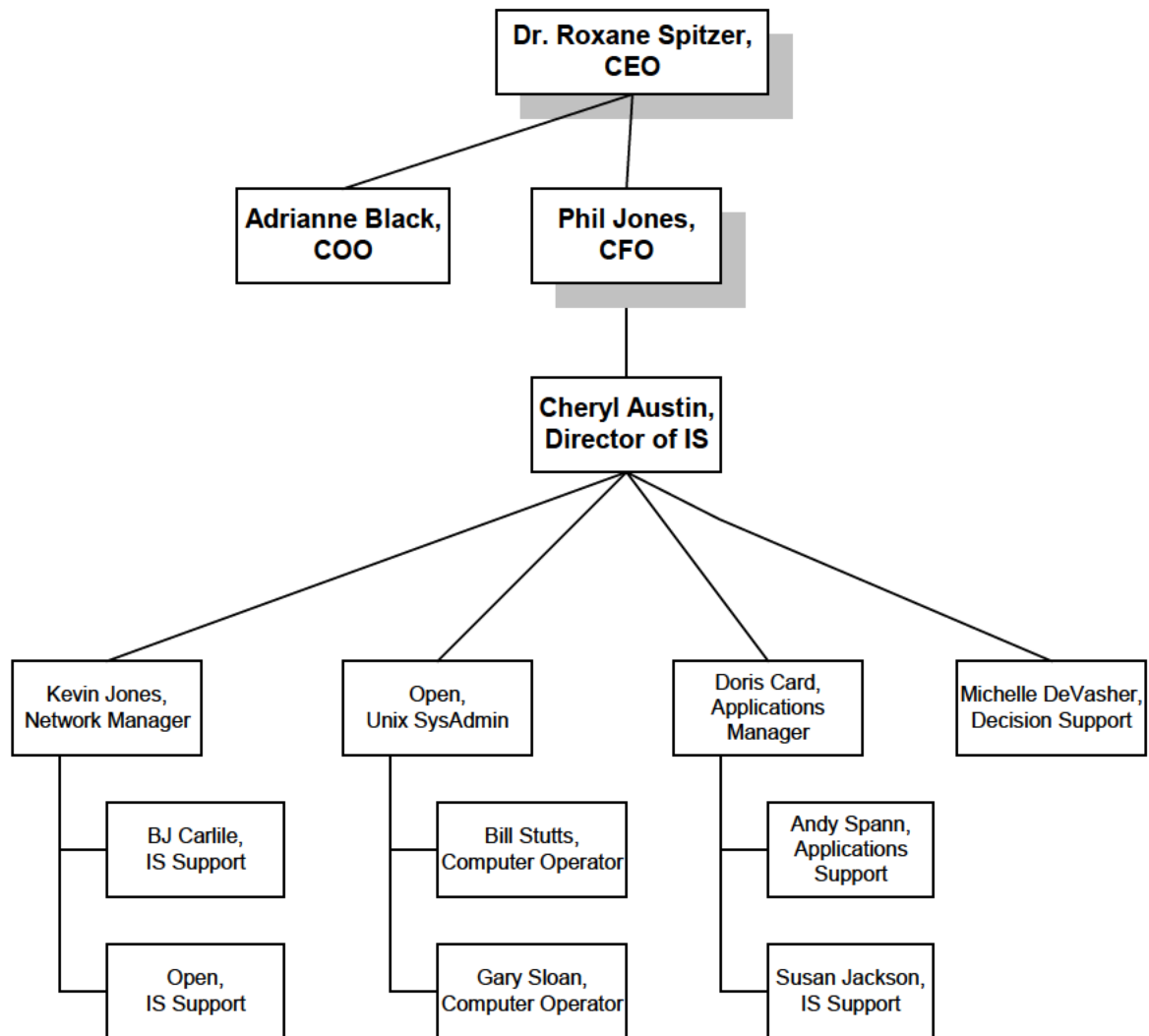
SERVICES:

The Information Systems department is challenged to meet JCAHO standards, HIPAA guidelines, increase operational efficiencies, deploy new applications and functionality, and train users. The services provided by the IS department are primarily centered around systems installation, support and trouble-shooting. A Help Desk was instituted in July, 2000, which is staffed from 8am-4:30pm weekdays. This enables users throughout the organization to notify the IS department of a technical, support or service issue. Issues are prioritized and tracked using an MS-Access database. Applications support is provided for the major hospital systems (Affinity, Lab, Pharmacy, etc.) and for various technology-related projects (Pyxis, etc.). Decision support and ad-hoc query services are provided by designated IS staff.

INTERNAL/EXTERNAL CUSTOMERS:

Internal and external entities which the IS department serves or has interaction with include:

- All hospital departments, including off-site entities such as the Primary Care Clinic (PCC) and Maternal and Infant Care clinic (MIC).
- Aligned physicians, including attending and resident physicians, as well as physicians affiliated with the Meharry Ambulatory Care Center (MACC)
- Aligned institutions, including Meharry Medical College, Vanderbilt University Medical Center, Bordeaux Hospital, and Our Kids, and their respective departments, coalition and/or research groups, faculty physicians, residents and medical students
- Other healthcare providers, such as tertiary care centers, rehab centers, skilled nursing facilities, long-term care facilities, doctors offices, clinics, etc.
- Payors, insurance companies, HMO/PPO/MSO organizations, and various vendors
- Metropolitan Nashville-Davidson County Government and the Metro Information Services Department (Metro ISD)
- External research or regulatory entities involved with data aggregation and/or comparative databases, data exchange, and/or data analysis. See Chapter 5 for details regarding Exchange of Information with these entities.

Information Systems Organizational Chart

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                    │  Dr. Roxane Spitzer, │
                    │         CEO          │
                    └─────────────────────┘
                     /                  │
        ┌──────────────────┐   ┌──────────────────┐
        │  Adrianne Black, │   │   Phil Jones,    │
        │       COO        │   │       CFO        │
        └──────────────────┘   └──────────────────┘
                                        │
                               ┌──────────────────┐
                               │  Cheryl Austin,  │
                               │  Director of IS  │
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Kevin Jones, Network Manager	Open, Unix SysAdmin	Doris Card, Applications Manager	Michelle DeVasher, Decision Support
BJ Carlile, IS Support	Bill Stutts, Computer Operator	Andy Spann, Applications Support	
Open, IS Support	Gary Sloan, Computer Operator	Susan Jackson, IS Support	

IS Steering Committee

The IS Steering Committee provides the high-level strategic planning for information systems and technology projects at MNGH.

PURPOSE:
Information Systems is a critical technological resource essential to support the strategic direction of our healthcare enterprise. As technology advances and our strategic direction and goals mandate on Information Systems strategy, this committee will drive this process consistent with the mission, vision, values and strategic goals.

OBJECTIVES:
- Determine short and long term need of the institution consistent with strategic goal direction.
- Determine current status/ability of hospital systems.
- Identify gaps in current versus required status.
- Prioritize applications required to meet gaps with critical timeline.
- Identify resources essential to meet requirements.
- Receive input from Information Management Functional Group.

MEMBERSHIP:
Chair, IS Director – Cheryl Austin
Co-Chair, CFO - Phil Jones
Laboratory/Pathology – Jerry Gowen
Finance – Don Ignatz
Medical Staff – Dr. Juli Dean, Dr. William Rodney
Patient Care Services – Jean Pennington, George Beasley
Medical Imaging – Willie Hannah
HIM – Danny Mays
Rita Carter - minutes

CEO – Dr. Roxanne Spitzer, ad-hoc
Information Systems – Doris Card, ad-hoc
Others ad-hoc as necessary

Information Management Functional Group

PURPOSE:
Delivering health care to patients is a complex endeavor that is highly dependent on information. Information is a resource that must be managed effectively by the hospital to meet patient care, regulatory, and JCAHO requirements. The Information Management Functional Group helps to ensure all information throughout the organization – whether paper-based or electronic – is managed appropriately to meet these requirements, as well as providing support for realizing the mission, values and goals of the institution.

OBJECTIVES:
- To ensure all regulatory and JCAHO information management requirements are met.
- To assist in information planning, implementation, and management processes to meet the organization's internal and external information needs.
- To effectively and continuously improve information management throughout the organization.
- To ensure data security by balancing the requirements of security with the ease of access to information.

MEMBERSHIP:
Co-Chair, HIM Director – Danny Mays
Co-Chair, IS Director – Cheryl Austin
CFO - Phil Jones
Administration - Robbie Newlin
QA/UM - Betty Cochran
Patient Accounts - Don Ignatz
Chief Medical Officer - Dr. Reginald Coopwood
Internal Medicine - Dr. Donald Boatright
MACC - Austin Swett
MIC – Chris Taylor
Medical Imaging - Willie Hannah
Access - George Beasley
Library - Glenda Perry
PCC - Stephanie Roth
Information Systems - Michelle DeVasher
Laboratory - Jerry Gowen
Nursing - Lena Cartwright
Rita Carter - minutes

Environmental Services - Marilyn Beck, ad-hoc
Materials Management - Roger Larkin, ad-hoc

Library Mission and Scope

MISSION:
It is the mission of the library to provide information to help health professionals acquire and maintain the knowledge and skills they need to care for patients; to support clinical management decision making; to support performance improvement; to satisfy research-related needs; and to support patient/family education.

SCOPE OF SERVICE:
- Maintain a core collection of current textbooks and journals appropriate for the needs of the population served
- Provide reference service in the form of manual and online literature searches and provide instruction for users who wish to do their own searches.
- Obtain books and articles not available in this library from a variety of other sources, including interlibrary loan, purchase, government agency, etc.
- Maintain photocopying equipment and supplies for the use of library patrons.
- Assist with circulation and maintenance of videotape library provided by
- Health and Science Television Network (HSTN).
- Coordinate educational teleconferences and use of closed-circuit television system.

IMPORTANT ASPECTS OF SERVICE:
- To meet the information needs of physicians and other health care professionals who use information to make decisions about patient care.
- To provide information services for managerial staff who will use it to make decisions about policies affecting the operation of the facility.
- To provide information for employees for continuing education or for personal use.
- To provide library services for students and faculty from affiliated educational institutions.
- To provide information for patients and their families, when requested.

OPERATIONS:

The MNGH Health Sciences Library is located on the 9th floor of the hospital. It is accessible by all staff, physicians, and other authorized individuals via access badge swipe. A full-time librarian is available daily Monday-Friday. Requests can be made to librarian for custom searches or other literature retrieval. Materials may not be removed from the library without permission from the librarian. Free photocopying services are available for library materials. A listing of the resources available in the library can be found in Chapter 5.

Proposed Projects

Summarized below are projects – by system or issue - which satisfy a particular need that was brought up during our user needs assessments, and/or help meet the hospital's and the IS department's strategic goals. Costs shown are preliminary estimates and are subject to change. The extent of IS involvement and resources required are also estimated.

It will be the mission of the IS Steering Committee to help prioritize and fund these projects. It will be the mission of the Information Management Functional Group and the IS department, along with selected other department heads and hospital staff, to assist in operationally carrying out the projects. On-going needs assessments may alter this project list, as well as project priorities.

Affinity Projects

Note: since many projects have preceding project dependencies, this list is shown in approximate chronological order.

- *Deploy existing printers.*
  Laser network printers were purchased for Affinity usage on the units. Laser personal printers were purchased for individual PC usage. These need to be deployed. IS currently does not have expertise in-house to configure printers on Affinity.
  COST: N/C (already purchased)
  IS: wait for hire of Unix System Administrator to help with Affinity printer deployment, or obtain contract assistance.

- *Evaluate centrally printed reports for usefulness, change to print locally when possible.*
  Many reports are not being used or can be significantly decreased (for example, print just the final summary or total page and not the detail). Many reports are available to be printed or viewed on the screen by the user, rather than printed by IS in batch. Installation of laser printers (already purchased and not yet deployed) on the units will enable more local printing. The centralized printing of reports and delivery to the units requires 0.75 FTE from IS, which can be better utilized on other IS projects.
  COST: N/C
  IS: requires personnel time to evaluate current reports, alter reports if needed (edit existing queries or write new queries), place the report options on the users' menu, train users to print their own reports.

- *Archiving reports onto CD-ROM.*
  Daily and monthly reports should be archived onto CD-ROM. This eliminates storing paper reports for many years (which we now do), and enables users to gain ready access to the data when needed. Additionally, backup copies of these CD-ROMs can be stored off-site for increased data security.
  COST: approximately $2500/year in supplies
  IS: 0.2 FTE to copy reports onto PC then onto CD-ROM, catalog data on each CD, maintain and distribute CDs.

- *Train users on existing modules and obtain post-install audit.*
  Training and consulting services may be purchased from Quadramed. These on-site training/consulting services are available for $1,000-1,500 per day (plus expenses) per person. Examples include:
  - Training for users on existing functions, such as General Ledger, Medical Records, Query Language.
  - Training for IS staff on systems management functions: release management, operator training, datasets, networking, device/printer setup, system audit, space monitoring, journaling
  - A "Post Affinity Install Audit" to evaluate our current use of the system, to ensure we are using it to its fullest.
  - A "Best Practices" consulting engagement to addresses workflow issues.
  - Master Patient Index Cleanup training and assistance, needed for HIPAA compliance.
  - Auditing and Monitoring Services for coding compliance and reimbursement (OIG).
  COST: user training $18,000 plus expenses, audit $7,500/2-days plus expenses, best practices $7,000 plus expenses, MPI cleanup $7,500 plus expenses, compliance $7,500 plus expenses.
  IS: IS staff would need to be involved in each session.

- *Increase in-house training of users.*

Information Systems personnel will hold classes to provide Affinity training to new hires and to physicians. We will increase the use of resources such as the Affinity CD-ROM and look for other resources and avenues to provide user education.
COST: Training facilities – evaluate whether current training room is sufficient; materials/supplies $3500.
IS: staff involvement 0.5 FTE.

- *Use modules and/or interfaces purchased but not currently in use.*
  Chapter 2 highlights some modules and/or interfaces which were purchased but are not currently operational. For example, the download interface from the Affinity Acuity module to the Ansos/OneStaff module. Each module requires an analysis of the barriers to its use, and a plan for putting it into use, including user training. If it is determined that the module is not needed, it should be removed from the system and a cost savings should result (lessening of the monthly software maintenance costs).
  COST: N/C (modules already purchased)
  IS: approximately 1 FTE for analysis and implementation for duration of project

- *Re-write General Ledger's Chart of Accounts.*
  The current General Ledger numbering sequence in Affinity is different from all other systems used by MNGH (FastNet and HBOC). This precludes our having interfaces among our systems, which in turn causes manual work-arounds which are time-consuming and error-prone. Analysis and decision-making is extremely difficult because these systems are out of sync with each other. The current chart of accounts does not group revenues and expenses into cost centers and does not facilitate management decision-making. Affinity has a utility which allows re-numbering the G/L accounts. This conversion process, while not technically difficult from Affinity's standpoint, will require every charge code be re-tested in the system. A patient accounting to G/L crosswalk would need to be set up to reflect the new chart of accounts and to correctly map revenues, A/R, etc. Thus it will involve Patient Accounts as well as Finance. Once completed, interfaces we have previously purchased and have been unable to implement between HBOC Materials Management/Central Supply and Affinity will be possible. Additionally, an interface, in the form of monthly uploads/downloads will be possible between FastNet and Affinity. This will greatly streamline our materials charging processes as well as our financial accounting processes, and will increase our decision-making and analysis capabilities with the system. Other G/L changes, such as creating salary accounts in Affinity to match FastNet would also greatly improve financial processes.
  COST: Consultant hours from Affinity, perhaps totaling up to $5,000.
  IS: IS assistance through the conversion and testing processes.

- *Implement HBOC interfaces to Affinity.*
  Once the step above is completed, it will be possible to implement the Materials Management and Central Supply interfaces to Affinity. This will allow tighter control of floor stock charging and automatic charging of items to patient accounts, as well increased ease of use and decreased manual processes involved with supply procurement and disbursement. These interfaces were already purchased and never installed.
  COST: Expenses for HBOC consultant to assist with implementation, perhaps totaling $2,500.
  IS: extensive IS involvement will be required during setup, testing and training.

- *Upgrade operating system to Cache 50/50.*
  Upgrading the operating system is necessary before we can move to a new server. The existing operating system is being phased out by the vendor. We were contractually required to upgrade one year ago, but held off due to system performance issues. We do not have in-house expertise to accomplish this; we will need to contract with Quadramed to provide.
  COST: $150/hr plus expenses (est. $6,000).
  IS: staff involvement, Unix System Administrator.

- *Purchase a new Affinity server.*
  A new server has been selected and priced at $240K, yearly maintenance $26K (Note: this maintenance fee represents a savings of almost $18K per year over our current cost). The migration of data from the old server to the new server will require a major effort, including contracted assistance from Quadramed and Data General. Only when we have the new server installed will we be able to install additional modules and to support the next Affinity release.
    - The new server would provide significantly more processing power and disk space, allowing us to retain information longer before purging. Currently, retention of patient information is driven by limited ability of the system rather than the needs of the users (IM 6.1). The new server would allow us to better meet the needs of the hospital to have historical data readily available.
    - The new server will significantly speed up processing. Processing time to install new releases (with associated downtime), do daily backups and nightly maintenance, will be cut to one-third of current times. Users will see increased performance as well.
    - The additional processing power and disk space would allow us to enable the auditing/logging feature. This would enable us to track each user's use of the system, thus being able to control inappropriate access (IM 2, IM 7.1.1).
  COST: $240,000 (capital) + $26,000/yr. maintenance + $12,000 contract technical assistance
  IS: staff involvement

- *House the new server within MNGH IS dept.*
  Locating the new server within the MNGH IS dept. allows us to reap cost savings in the form of reduction of support payments to Metro ISD, while giving us more control and a more secured environment for the data.
    - Bringing the server in-house means that we would have fewer sources of possible failures and outages than we currently have (for example, the fiber link).
    - Access to the hardware and data would be under our direct control (IM 2).
    - Staff would need to be available 24x7 at MNGH to appropriately monitor the system.
  COST (est.): decrease payments to Metro ISD by $27,000 over 6 months
  IS: additional 1.5 FTE IS staff required.

- *Re-Evaluate Data Retention Criteria.*
  With the increased capacity of the new server, data retention criteria need to be re-assessed. See Chapter 5 on current Affinity purge criteria. These should be able to be lengthened to better meet needs.
  COST: N/C
  IS: 0.5 FTE for duration of project

- *Turn on Auditing/Logging Features.*
  With the increased capacity of the new server, the auditing/logging feature should be turned on and monitored. This feature allows tracking of user access, and is required for HIPAA compliance. Regular audits of appropriate usage need to be conducted by IS staff.
  COST: N/C
  IS: 0.2 FTE

- *Replace dumb terminals with PCs.*
  In order to prepare for future releases of Affinity, all existing terminals (currently 83) will need to be replaced with PCs. Expected cost will be approximately $107K. Cost savings due to not maintaining a support contract on those 83 terminals is approximately $12K per year.
    - Use of PCs rather than terminals means that existing terminal servers will need to be replaced with Ethernet hubs. Expected cost will be approximately $22K.
    - More widespread use of PCs will necessitate additional PC support personnel (1.0 FTE) will be required in-house.
  COST (est.): $107,000 + $22,000 (capital), decrease support cost by $6,000 over 6 months.
  IS: additional 1.0 FTE IS staff required.

- *Install Affinity version 8.0 release.*
  This will be a major release necessitating extensive user training and on-site assistance from Quadramed. All Affinity usage will need to be via PCs instead of terminals before this release (see above).
  COST: $12,000 contract technical assistance
  IS: extensive IS staff involvement, 2.5 FTEs for duration of project

- *Add additional Affinity modules.*
  Additional application modules should be purchased to increase the capabilities and usefulness of the Affinity system, increase data availability, and streamline current manual processes. The most needed of these include:

  Health Notes: Provides electronic transcribed reports, electronic signature, and management tools for medical records transcription. This would allow improved access to clinical information throughout the organization, especially as it pertains to continuity of care. Having electronic signature means improved turnaround times and increased physician satisfaction (reports can be "signed" from anywhere in the hospital). Having reports available on-line means that less time is required from the HIM department for locating charts and faxing reports. This results in a substantial time and cost savings, while improving patient care.
  COST: Software License = $70,000, Installation = $20,000, Annual Support = $10,000

  SQL-Connect: This is a database reporting tool that allows users to more easily create ad-hoc reports. Currently, end-users perform many hours of manual data manipulation to arrive at data results that may or may not be accurate. This adversely affects the profitability and efficiency of our organization. Data that could be analyzed to provide valuable information, trending, and/or process improvement is not being used, translating into lost opportunity. Thus, the on-going cost-savings could far exceed the one-time implementation cost of the module. This one reporting system can be used to support multiple departments and needs throughout the organization. This module would also permit the Decision Support Specialist to be more productive and responsive in getting needed reports and queries out to end-users, because it provides insight to the Affinity tables and would allow queries to be written in less time. Because it is also a user-friendly tool, end-users can be trained to run their own queries, allowing data to be analyzed as needed from the desktop.
  COST: Software License = $35,000, Installation = $19,000, Annual Support = $6,750

  Contract Management: Automates reimbursement, DRG, stop loss, rates, contract billing, forecasting, payment tracking, and reports for financial management. Currently, these processes are done manually on a monthly basis on just a group of patients (not all) because the volume is too large. This module would allow analysis on *all* patients to be done *daily,* with the potential of obtaining higher collections. Having contract reimbursement information available on-line would greatly streamline the work done by collectors, and would provide other operational enhancements which translate into cost savings and/or increased revenues.
  COST: Software License = $45,000, Installation = $22,000, Annual Support = $6,750

  Quality Management: Automates indicators, blood usage, infection control, and incident reporting. Currently these are manual processes. Having this module would improve efficiency, and allow more and much improved data analysis and reporting. This will directly tie into performance improvement efforts.
  COST: Software License = $35,000, Installation = $20,000, Annual Support = $5,000

  Eligibility & Payment Advice: Electronically communicates payment and adjustment information on health care claims submitted to a payor for adjudication. Conforms to new HCFA EDI standards. Automated electronic postings would streamline processes and decrease FTEs needed for this activity (currently done manually), while increasing accuracy.

COST: Software License = $26,000, Installation = $$7,000, Annual Support = $3,700

Patient Liability: Automates classifying of the "self-pay" accounts by ability to pay (Medicaid liability). Income, assets and liabilities are reviewed and stored within the patient record, along with rate calculation. Serves as a good audit and compliance tool, produces monthly statements informing patients of their liability, allows for rebilling when patients obtain Medicaid eligibility, produces Memorandum of Agreement and calculation worksheet. This is important in an institution such as MNGH where so much of the population is self-pay and/or TennCare eligible, and thus this module could translate into a substantial time and cost savings, while increasing revenues.
COST: Software License = $57,500, Installation = $22,000, Annual Support = $8,280

Utilization Management: Automates case statistics for QA/UM. Currently this is a manual process. Having this module would increase efficiency and productivity of the QA/UM department.
COST: Software License = $35,000, Installation = $18,000, Annual Support = $5,000

Clinician Access: This provides a Web-based front-end to Affinity, making data accessible via a Web browser and a "point-and-click" interface. This would increase the user-friendliness of the system, especially for physicians. It is important to note that this module *requires* the purchase of an *additional server*. Coupled with the right type of Internet connection, this could make Affinity data available over the Internet – for example, physicians could access data from home or anywhere. There are significant HIPAA issues to contend with, such as requiring data encryption, smart-card type secure access, firewalls, and other additional technologies, which are expensive and complicated to implement.
COST: Software License = $50,000 +$40,000 for 30 simultaneous users; Installation = $15,000; Additional server = $15,200; Annual Support = $13,500 for software + $1,250 for hardware.

Ancillary Systems Projects

Per-Se OneStaff/Ansos interfaces:
Acuity information from Affinity needs to be downloaded into the Ansos application. This interface was purchased originally when the Ansos system was purchased, but it was never installed and tested. Installation and testing of this interface is currently underway, and it should be operational in September, 2000. A bi-directional interface to the Kronos Timebank system is desired, and would provide the needed computerized acuity/staff requirement reports needed for nursing. The cost of this bi-directional interface is $14,715, plus an additional $2,500 annual maintenance fee.

Bed Tracking:
Although Affinity has a utility for tracking patient beds, this has not proved to be very useful in practice. When a patient is discharged, Affinity sends a printed request to environmental services saying that the bed needs to be cleaned. However, the environmental service technicians are not located near the printer, but are scattered on the floors actively engaged in doing their work. Another system, which beeps the technician that a bed needs cleaning, would be preferable. Our current Meridian telephone system has a utility for doing this, which should be further investigated. Additionally, a third-party hardware and software solution was investigated preliminarily which appears to be a viable solution. The complete bed-tracking system from Tele-Tracking Technologies, including hardware, software, and interfaces, would cost approximately $2,000 per month (no up-front purchases, only monthly licensing fees).

Blood Bank:
The Sigma Blood Bank system needs to be replaced. Because the hardware is antiquated and the software is no longer sold/supported by the vendor, a new platform and new system must be considered. Initially, when the CCA lab and pharmacy systems were purchased, it was thought that the CCA Blood Bank system could also be purchased. However the CCA Blood Bank system has not obtained FDA approval and is not currently on the market. CCA has instead partnered with MediWare to provide an interface between the CCA lab system and MediWare's HemoCare Blood Bank System. This is also the same blood bank system used by Vanderbilt Medical Center. The cost for the HemoCare hardware and software is $73,666, plus an annual support fee of $12,000. The cost of the interface from CCA is $3,000 (labor charge only, interface software provided free of charge). The new server would be located at MNGH (rather than at Metro ISD). IS involvement would be substantial, and currently we do not have staff with adequate skill and time to take on this project. It was thought that we could hire a Mater's-level student from Vanderbilt part-time to facilitate this project.

Laboratory:
- A new release of the CCA CyberLAB system is now available and needs to be installed and tested as soon as possible. However, due to turnover in the laboratory, no date has yet been set for this.
- An operating system upgrade to the CCA server is long past due. This has not been acted upon because we do not have IS personnel (a Unix System Administrator) with the required skills to perform this upgrade.
- The CCA Anatomic Pathology module has already been purchased, but has not yet been installed. The plan was to begin installation and training of staff in late-September, 2000. However, due to turnover in the lab, this date may need to be rescheduled.
- The CCA Reference Lab interface to Vanderbilt has already been purchased but not yet installed. Vanderbilt recently upgraded their lab system, and MNGH is waiting for interface specifications from Vanderbilt to be worked out. No date has been set for installation or testing.

Pharmacy:

- On-site training by CCA on the Pharmacy system was performed in July, 2000. During this site visit, it was determined that many of the entries in the drug database and in the charging functions needed to be cleaned up and edited. This was accomplished during August, 2000.
- The charge interface between the CCA Pharmacy system and the Affinity system has not worked since the systems were installed, and all pharmacy charges have been entered manually into Affinity. This process is time-consuming and error-prone. CCA finally re-wrote the charge interface programs, and testing was performed during August, 2000. This new charge interface will go live on or before September 1, 2000.
- A Pyxis drug dispensing device was installed in the ER. Interfaces between Pyxis and the CCA pharmacy system were tested. This Pyxis system will go live on or before September 1, 2000. Additional Pyxis units may follow in other hospital areas. Installation and testing of a profiles (order entry) interface would need to happen at that time, requiring significant IS involvement.
- Other modules, such as the outpatient prescription module, which are not being used but have already been paid for, need to be evaluated and if appropriate, placed into service.

Materials Management:

On-site training and system evaluation from HBOC is scheduled for Sept./Oct. 2000. Many interfaces purchased with the system were never installed. This is because the Affinity system uses a different general ledger numbering scheme from that used in the Materials Management system. This should be rectified (see Affinity projects described above dealing with the General Ledger Chart of Accounts and deploying the HBOC interface). Having the HBOC-Affinity interface would greatly streamline and increase the accuracy of patient charging, floor stock inventory, and supply and cost tracking. An interface from HBOC to FastNet could help with contract management, and cost accounting activities.

FastNet:

MNGH is required to move to the new JD Edwards Payroll and HR system, beginning in October, 2000. To do so, an interface is needed between MNGH's Kronos Time and Attendance system and the Fastnet system. However, before such an interface can be tested, the pay codes and calculations within the Kronos system need to be edited and updated. This will take a collaborative effort with Human Resources, Finance and Information Systems, as well as some consulting time from our Kronos vendor. The cost of the Kronos interface is $11,400, for both MNGH and Bordeaux hospitals (split 50/50, so actual cost to MNGH is $5,700). Consulting time from Kronos could run another $2,500. As part of the Metropolitan Government, MNGH is required to make this change. The old payroll system (currently in operation) is being phased out.

A monthly upload of Affinity General Ledger data to Fastnet's General Ledger system would greatly streamline current accounting practices, and increase the ability to do financial analyses and decision-making. Currently, this is not possible because each system uses a different G/L numbering scheme. This should be rectified (see Affinity project described above dealing with General Ledger Chart of Accounts).

Infrastructure and Connectivity Projects

<u>Upgrade of Network Infrastructure:</u>
Our current infrastructure – the wires connecting every server and PC together, and on which data flows – is rated at 10Mbps throughout (backbone and nodes). Beginning more than a decade ago, the industry standard was to have a 100Mbps backbone, with 10Mbps PC nodes. Since about 1996, the industry standard has been 100Mbps throughout. Today, the standard is 1Gbps technology, at least for the backbone. Thus, MNGH's infrastructure is a factor of 10 to 100 times slower than current technology. This will severely hamper our technology growth. To remedy this, all of the electronics (hubs, routers, and switches) will need to be replaced, and some of the network cards in the PCs and servers may need to be replaced; however, most of the actual wiring will *not* need to be replaced. Still the cost to replace the electronics alone is estimated at $200K.

<u>Connectivity to the PCC:</u>
Network electronics and fiber connection hardware is unsecured at the PCC. These need to be located in a conditioned and secured (locked) location.

<u>Connectivity to Meharry Faculty Offices:</u>
A fiber connection can be made from MNGH's patch panel in the MACC to Meharry's network closet, directly behind it. The cost of the fiber connection (materials and labor) is approximately $1,000 or less. However, once the two networks are connected, there are major security concerns. MNGH traffic can flow openly through Meharry network lines, and vice versa. It will therefore be necessary to insert a router and firewall to prevent unwanted traffic from flowing between the two networks. These can be configured so that only certain IP addresses (the IP addresses of the desired faculty PCs) will be able to communicate with certain other IP addresses (such as MNGH's Affinity server). The cost of the router and firewall, including hardware, software, and configuration is approximately $9,000. It may also be desirable for Meharry to insert their own firewall, so that each entity feels secure in protecting its interests. This project will require utmost cooperation among MNGH, Meharry and Metro IS, to ensure total security is maintained throughout our mutual networks. This project is of high importance. Meharry physicians care for MNGH's patients, and obtaining patient information in a timely manner is not only a matter of good patient care, but will help attract and keep physicians admitting patients at MNGH.

<u>Network Protocols:</u>
Our Novell Network was set up with IPX/SPX as its communications protocol. All of our other servers operating on the same wires use TCP/IP as their communications protocol. The industry standard is a total TCP/IP environment. Many devices, such as printers, currently need to be supported in both the IPX/SPX environment and the TCP/IP environment. Having a common communications protocol running on the network will improve performance and make the network easier to maintain. Our Novell server can be readily converted to TCP/IP. This can be accomplished via an upgrade to Netware 5.0 (we are using version 4.2 currently).
COST: $4,000 for software, $8,000 for new Netware server.
IS: Network Manager involvement for approximately 80-100 hours.

Administrative Projects

Intranet:

MNGH has a frequent need to share information among its staff and various departments. Often, this is done via paper or via attaching a document in an email. These methods of disseminating information are fraught with problems. Paper documents get lost, are expensive to produce and distribute, can't be found when needed, and when found there is no way to tell if you are looking at the latest (most current) version. Sending documents via email is wasteful, because if the user sends a single document to 50 people, there are 50 copies of that document stored electronically taking up valuable disk space on the network and email server. Electronic documents can be stored and named different ways when they reach their destination, or edited or deleted by the user. So the sender has little control of the final disposition of the document. Once printed, the electronically sent document then suffers from the same problems as paper-distributed documents.

Many organizations have found the way to combat these problems is to create a company Intranet. This is similar to the Internet, in that it is comprised of web-based pages with various links between them. However, the data would be accessible only on the MNGH local network. Documents can be "posted" in a "bulletin board"-like fashion, allowing users to access them when needed via point-and-click. Using pdf file formats, users could easily open and view the documents but could, if appropriate, be restricted from editing or printing the document. Each document would have an "owner" (an individual or department) responsible for keeping it up to date; i.e., removing the old version from the "bulletin board" and posting the new version. Below are some examples of information and documents which could be shared in this fashion.

- Policies and Procedures Manuals
- Life Safety Manual
- Cafeteria Menus
- Phone lists
- Fax lists
- Beeper lists
- MNGH Event Calendar
- Newsletter, Transitions
- Daily announcements
- Rules Book
- Instructional documents
- Human Resources info: job openings, forms, policies
- Various forms, such as Facilities Management work orders, IS User Profile Requests, etc.
- Job Descriptions
- Orientation and Inservice Materials
- Performance Improvement Materials
- Clinical Pathways and other clinical documents
- Map of the hospital

Having an Intranet is the best way to improve communications within the organization and can prove to be a time-saver and cost-saver. Even users who do not have individual PCs (such as housekeeping staff) could have access to the Intranet via a "kiosk"-type (shared PC) setup. In contrast to knowledge-bases (described below) which are purchased external resources made for internal dissemination, the Intranet would be used for internally-produced original communications. Many companies have been creative in the items placed on their Intranet, allowing users for example, to complete a job application online, or complete a form online and have the answers automatically populate a database. Having an Intranet can favorably impact workflows and streamline processes.

COST: less than $1,000 for software, $4,000 for hardware

IS: 0.5 FTE to be the Intranet "webmaster".

Knowledge-Bases:
There are many sources and compendia of information, many available via CD-ROM on a subscription basis, which can and should be made widely available at MNGH. It is not cost-effective to have a single user purchase a CD containing important reference information for use on only a single PC. Instead, a CD-tower can be purchased and a CD-server implemented to share these knowledge-based resources. Once on the network, these knowledge-bases will be available to anyone with a PC. This puts the knowledge-bases right at the fingertips of the users, when they need it. No longer would they need to physically go to the library or to another user's PC to access these materials.

Micromedex has several such databases available on CD-ROM. Drugdex is the database containing drug information, including dosing, interactions, warnings, etc. This can be a valuable tool to all physicians, especially residents who may not know correct dosing or interaction for drugs in our formulary. Identidex is a database containing the searchable pictures and physical description of drugs (the little numbers inscribed on the pill, shape and color of the pill, etc.). This is useful when a patient presents in the emergency room and can't tell you the name of the medication they just took, but has some of the pills on hand.

There are many other useful knowledge-bases available. Some are reference or authoritative, such as an online medical dictionary, medical textbooks and journals available on CD, coding reference materials (ICD-9, CPT-4, HCPCs), yellow pages and phone books on CD, maps and directories, etc. Some are comparative databases, such as management data from AHA, practice guidelines, etc. Some are educational, such as having certain CD-ROM based training, whether for computer training or clinical training.

Journals and medical textbooks on CD-ROM deserve special consideration, due to current library issues. There is an effort to avoid duplication between the MNGH library and the Meharry library. Yet, there are some basic standard textbooks and journals that many physicians want ready access to, but cannot go outside of the hospital onto Meharry's campus to retrieve. Having these items available on CD-ROM in-house would be ideal. The MNGH library has reported books and journals get easily stolen, whereas the CD-ROM could not be. Books and journals in the MNGH library can be used by only one person at a time. Putting these items available on the network means many people could access them simultaneously.

The cost of each of the knowledge bases varies from a low of $50 to a high of about $2,000+ each. The technology to make these knowledge-base resources available online is not complex. A CD-tower that houses perhaps 8-14 CDs can be purchased for approximately $6,000, and would interoperate with our existing Novell server. Additional CD servers and/or larger CD towers can be purchased, depending on need.

Education:
Hospital-wide, there is a need for continuing education. Nurses and allied health professionals need CEUs, physicians need CMEs, and all users have requested computer training. Currently, HSTN comprises the bulk of our clinical continuing education. Programs are watched live on cable or taped programs may be requested. The cost for this program is high and there is discrepancy about its overall value. To obtain computer training, users are currently required to go off-site to attend Metro-sponsored or private company sponsored classes. These classes have not been widely used and their overall value has been variable.

The Internet has become an excellent source for disseminating training of all sorts and should be leveraged for our educational needs. Internet-based training has the following advantages:
- Users can progress at their own pace. They do not have to sit through a class covering basics when they are at an intermediate level.
- Users do not need to be away from work to attend formal classes – this is often difficult to schedule.
- Users can learn on their own time, from home, or at work – it is convenient.

- Learning is measurable. When watching a video or attending an off-site class, there is no way to measure what the user actually learned. With Internet learning, it can be interactive, with online tests. Test scores can then be reviewed by supervisors.
- Professionally developed curricula are available. MNGH does not have to develop its own educational materials. Over the Internet, MNGH staff can access the same quality educational materials used at nationally renowned institutions (Duke University, Cleveland Clinic, etc.).
- Courseware is constantly updated. MNGH is not purchasing a disk or tape that will be outdated in a couple of years.
- The mechanics of the delivery are simple (no VCRs, satellite, or other equipment to buy and maintain).
- Technical support is provided by the online company, not our already thin internal resources.

There are many healthcare institutions, including Vanderbilt, Meharry, Duke, and Columbia/HCA who are using an Internet vendor called HealthStream for their educational needs. HealthStream offers computer-based interactive courses on compliance and regulatory issues, clinical and non-clinical training for healthcare staff, online CME credits, and complete record-keeping (competency assessments) for participants. Users can access HealthStream anywhere there is an Internet connection – at work or at home – and still maintain a record of their learning. Education is priced on a per-course basis.

Computer training is also available over the Internet. Mindleaders offers a wide variety of end-user and professional computer courses, including the MS-Office Suite products (Word, Excel, Access, etc.), which users throughout all departments have requested in our needs assessment. The cost for this is as low as $57.12 per user per year for an unlimited number of courses. Courses are interactive with online tests.

Information Systems Projects

Tools for PC rollout:

Each time a new PC is installed – whether upgrading an existing PC user to a newer, faster PC or replacing a dumb terminal with a PC or placing a new PC at the desk of new hire – there are many hours of setup, configuration and software installation required. Because this is a manual process, errors occur, and it is difficult to "standardize" the desktop. This process can be streamlined using a product such as Ghost. With Ghost, IS can build a single PC as the "standard", then "clone" that image onto other PCs as needed. This cloning process takes less than 10 minutes per machine, compared to a couple of hours per machine it takes presently. This would not only increase accuracy (fewer configuration, setup and software errors), but it would allow roll out new PCs more quickly and with less manpower. By January, 2001, MNGH will need to replace all 83 terminals with PCs. Older PCs, such as P75 models need to be replaced with newer PCs more capable of running the current suite of applications. New hires joining the organization need PCs. Because this is such a routine, ongoing, high volume, labor intensive and error prone process, purchase of the Ghost software should be given high priority.
COST: Unknown
IS: Once trained on its use, IS will save considerable time on PC rollouts.

Tools for PC tracking:

MNGH has over 270 PCs in use throughout the organization. Keeping up with the inventory listing of hardware and software on each of these PCs is daunting. IS has been attempting to keep up with the hardware (serial number and Metro tag ID number) in an Excel spreadsheet, but this list is at best 70% accurate. PCs break down and get swapped out, users change their work location, IS techs forget to update the spreadsheet every time a new PC is rolled out, and other imperfections exist in this manual process. For software license tracking, the tracking has been even worse. Even if the software installed on each machine was recorded correctly initially, additional software may get installed over time, either by the user or by IS, or software which was installed initially on a PC is never used and so is later deleted. It has been impossible to track software licenses and ensure MNGH maintains license compliance. Blue Ocean's Track-It application runs on the network and can "query" each PC on the network for its hardware and software configuration, thus automating the procedure of maintaining an accurate hardware and software inventory. This automated auditing feature saves countless hours of manual, and imperfect record-keeping, and can help ensure MNGH maintains software compliance.
COST: Unknown
IS: Once trained on its use, IS will save considerable time in daily record-keeping.

Email:

More widespread email accessibility has been requested by every department. This would aid the departments in communicating with their staff, and would increase communications throughout the hospital overall. Additionally, current email users frequently exceed the limitations placed on the size of their mailbox (stored messages) and find living within the current size limitations cumbersome and anti-productive. In order to expand email services, a new email server will be required. New hardware, costing approximately $8,000 plus associated software at approximately $2,500 would be required. It may be possible to adapt the currently unused extra HBOC server to be used as the new email server with minor ($2,000 or less) modifications, a savings of $6,000.

Currently, some 200 email licenses were purchased incorrectly as Outlook licenses, and must be rectified. Once done, there will be some 100 licenses available for growth.

The ArcServe software currently used to backup the email server does not have the capability of restoring an individual mailbox, should that be necessary. All that could be done is to restore the entire post office. This is cumbersome. Another backup software solution should be sought and put into place.
COST: Unknown

IS: The Network Manager and Metro ISD would be involved in installation, testing and support of the new backup application.

Help Desk:
Recently, a Help Desk was instituted within IS, with a tracking database. Reports from this database can be used to improve operations. Each month, a random selection of users should be polled to assess the users satisfaction with the help they received from IS. Questions might include: Was your problem fixed in a timely manner? Was the Help Desk technician courteous and respectful? Feedback can help the Help Desk staff focus on performance improvement projects. Additionally, an analysis of the types of Help Desk calls can help point to specific training that is needed for the IS technicians or for the users. Currently, the IS department does not have enough manpower to do these types of analyses or user satisfaction surveys.

Downtime:
Better procedures are needed for downtime notification. Even though email notification is sent 24-hours in advance of scheduled downtime, not all users have email, and the word often does not get to the end-user. Overhead announcements are made within the hospital, but these cannot be heard at the PCC, the MACC, the MIC, and Our Kids.

Each department and every system user needs to be better acquainted with downtime procedures. Recovery from manual procedures after Affinity and/or network interruptions is often difficult due to synching up of the manual records after the fact. Better user education and written documentation of downtime procedures is required organization-wide.

Training Room:
Currently, our training room can only accommodate at most 8 people, and it is in such a small narrow space that instructor-led training is impossible. The students are oriented with their back towards the instructor and the board, and there is no room to show a projected image on the wall, or to write on a board where everyone in the room can see. A better-shaped and better-equipped space is needed, capable of accommodating a minimum of 12 people. More training classes have been requested from everyone throughout the hospital. Many want general PC classes on Windows and MS-Office applications. Physicians want classes on looking up patient information in Affinity. Vendors, such as HBOC or CCA, who come on-site to train our users need adequate space to hold their training sessions.

Computer Resource Center:
It would be ideal to have a place where users can go to use a scanner, color printer, 11x17" printer, modem, digital camera, or other special peripheral. These peripherals are expensive and usually are not used daily by users. Therefore, it makes sense to have a common area where these valuable resources can be shared. Although this could be set up in the training room, our existing training room is not large enough to accommodate this. Also, when classes are in session the equipment would not be available; then the room is locked when not in use, making access difficult. What is needed is a space, such as the library, which is accessible via card swipe, that could be accessible 24 x 7.

IS Space:
The existing space for the IS department's staff and activities is insufficient for today's operations as well as for growth planned in the immediate future.   Space requirements include:
- Additional employees' offices/cubes. At least 3-4 additional cubes/offices are needed.
- Space for PC and parts storage. Currently, the IS department is using three rooms on 8th floor. Beginning in 2001, the 8th floor is expected to be unavailable (build-out of cath lab). Additional space within easy access to the IS staff needs to be found.
- Workbench space for setting up and testing PCs and other equipment is needed. Currently, IS staff have no staging area for loading new PCs with software and hardware prior to roll-out to a user.

HIPAA/Compliance Projects

Complying with the new HIPAA requirements will be an extremely difficult, costly, and complex process. Ultimately, these changes should lead to cost savings, administrative simplification, and a more secure environment. However, implementation will require fundamental changes in health information systems, procedures and practices. Industry analysts predict obtaining HIPAA compliance will be much more costly and more time-consuming than Y2K. Below is a brief summary of some of the tasks and issues.

Organizational:

- A HIPAA Compliance Officer must be designated. This individual may double as the Security Officer in IS. This position must be supported and empowered by hospital administration to create and enforce needed changes.
- Additional staff must be dedicated to the HIPAA compliance effort. The project is bigger than one individual can handle in a serial fashion. Many portions of the project must happen concurrently in order to meet the time deadlines.
- An assessment of MNGH's current HIPAA compliance status must be undertaken. Significant issues should be brought to the attention of the hospital's Compliance Committee.
- Education and awareness campaigns must be begun immediately for all staff. On-going training of staff – not just a yearly inservice, but in-depth programs offered more frequently – will be required to achieve the required level of awareness and change.
- Legal, compliance, and risk management expertise must be brought into the fold. Hospital officials, including the hospital's Compliance Committee, must have a clear understanding of the regulations, the impact on the organization, and of the penalties for noncompliance.

Technological:

- Controlled access to information is paramount. Maintaining such security across multiple platforms, servers, and applications is difficult and time-consuming.
    - A security system that works seamlessly across the enterprise needs to be purchased and enacted. This means all systems must interface with one another.
    - Digital signatures/biometrics should be implemented for all individuals to access data.
    - External access to information, such as via dial up modems, etc., must be re-evaluated and secured with additional layers of technology (example: dial back, tokens, smart cards, automatic timeout, intruder lockout, etc.).
    - Monitors and alarms for intruder detection / unauthorized access should be implemented.
- Access to information must be restricted on a "need-to-know" basis, provided the patient has given consent.
    - Mechanism must be in place to block patient records where consent has not been obtained.
    - All access to and release of information must be logged. A patient should be able to request the list of individuals who had access to their information and when.
    - Users should have access only to data required for a particular function.
- Pockets of uncontrolled data (local Access databases, downloads into Excel, email, etc.) must be eliminated.
    - Once data is on individual PCs, it is extremely difficult to track/audit for access.
    - Diskettes and other media must be controlled and monitored (users taking data home).
    - Vendors who work on information systems and use data for testing purposes/troubleshooting must destroy data when done.
- Various elements of electronic information will need to be changed and/or new identifiers created. To a large extent, MNGH will rely on vendors of our existing systems to provide HIPAA-compliant upgrades. However, it will take a major IS effort to get these updates and changes tested and implemented across the organization.
    - Example: The Employer ID# and Patient identifier will change from say, a 7-digit field to say, a 10-digit field. Screens that capture these fields and reports that print these fields (including

forms) will need to be changed, cross-walks need to be constructed to "translate" the old numbers to the new numbers, programs that store or transmit these fields need to be changed (i.e., data that goes to the state, to HCIA, and other entities).

- Electronic transmission of data to payors and fiscal intermediaries will be required, and the format of these transactions will be strictly specified (ANSI X12N is the new EDI standard). Encryption and authentication will also be required.
- Coding sets may change. For example, use of ICD-10 and CPT-5.
- Disaster Recovery, including hot site capability and periodic testing will be required.

Procedural:
- Create hospital-wide policies and procedures for sending patient information externally (via email or electronically). Force blinding of patient identifiable information.
- A computer incident response team should be formed.
- Create a "chain of trust" with every entity we exchange information with. Enforce HIPAA guidelines dealing with patient confidentiality and data security in all vendor contracts.
- Implement an auditing function. The audit trail should capture all access to information, and maintain availability of this log for 7 years (or statute of limitations).
- The cost of obtaining compliance will be a major issue. Not only will other hospital projects need to be delayed due to the re-direction of funds, but additional sources of funding (unbudgeted) will need to be found.