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Setting the stage for an electronic health record:

A Business Analysis for the New York State Department of Correctional Services

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Update from the NYS Department of Correctional Services (DOCS)

Since the release of this report to DOCS, several changes have been made including DOCS Management Information Services Division has developed a Service Oriented Architecture (SOA) approach and has adopted a modern application architecture that is consistent with New York State Enterprise architecture standards and the New York State Integrated Justice Advisory Board (IJAB) standards. The previously noted "waterfall" development paradigm is no longer in use at DOCS.

DOCS application development model also recognizes the National Information Exchange Model (NIEM) standards, and DOCS considers NIEM as a preferred standard when considering third--party application interfaces and data exchanges.

November 2009

Executive Summary

Health care has become one of the largest expenditures for corrections programs nationwide In 2005 the US correctional enterprise spent $31.4 billion[1] with health care representing approximately 10% of the total budget. The amount spent on health care is growing annually at the rate of ten percent. This alarmingly fast rate of increase in health care spending has prompted the correctional community to look for new models and strategies for managing the correctional health care environment. Health Information Technology (HIT), and more specifically an Electronic Health Record (EHR), is seen by many as the ultimate tool for improving the quality of health care delivery, lowering health care costs, and providing better information for patients and physicians.

Although EHR systems in custodial communities have not been studied extensively, they are expected to provide valuable benefits in correctional settings, ranging from restraining growing health care costs by increasing efficiency and accountability, to improving public safety by eliminating inmate travel to specialty care appointments, and improving quality of care for inmates by offering easy and timely access to accurate and continuously updated medical records. The public itself is expected to benefit as well from the overall improvement in the health of inmates both while incarcerated and after their release.

The adoption of a fully automated health record has far-reaching implications for the New York State Department of Correctional Services (NYS DOCS), for inmates themselves and for all the organizations involved with NYS DOCS' inmates before, during, and after their incarceration. The work practices of every staff member with even the most minor connection to an inmate's health care will be affected. The extent of the changes necessary is not fully understood, but the criticality of making the change is. The NYS DOCS has successfully invested in the automation of related processes such as problem lists and appointment scheduling. However tackling the core challenge, the medical record itself, has been side-stepped. This is no longer possible if the agency is to realize the full potential of an EHR.

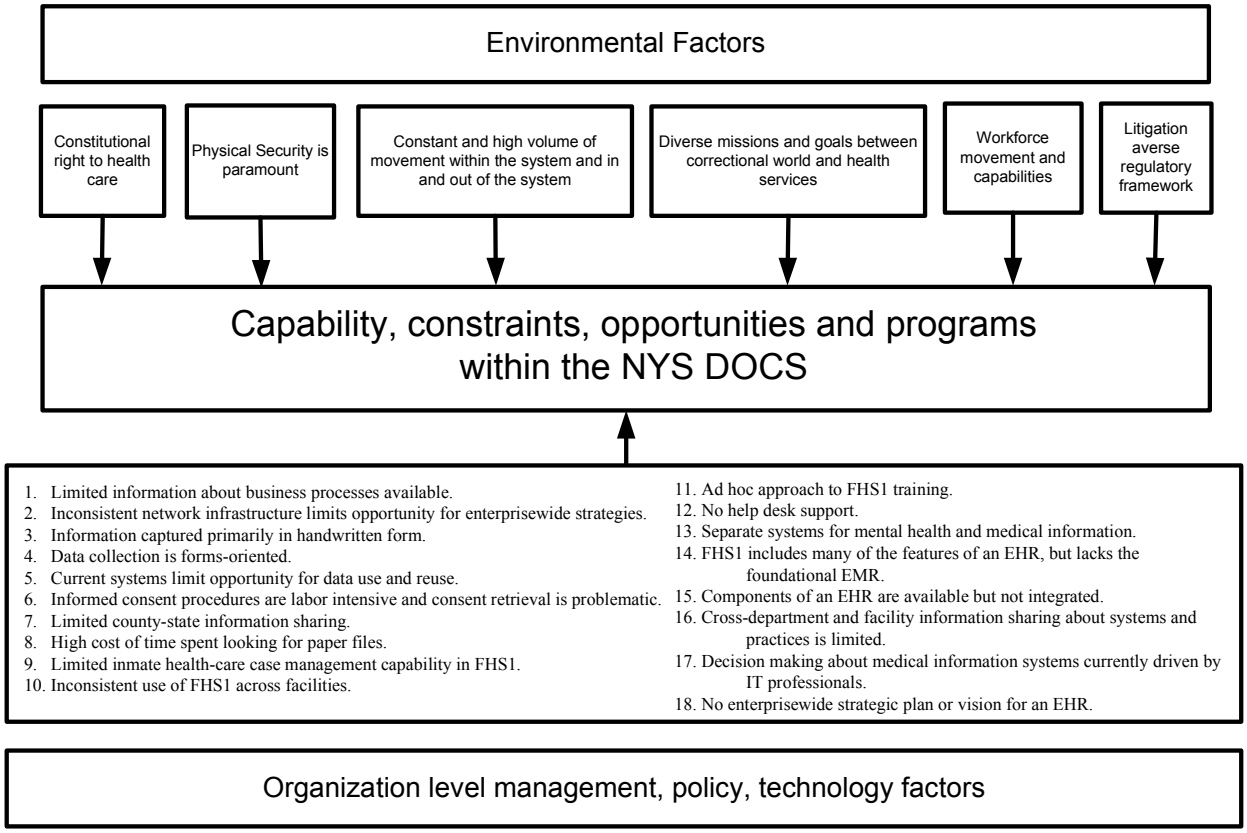
Unfortunately, the complexity associated with the transition from a paper to an electronic record is consistently underestimated. The complexity of this transition stems from the centrality of record creation, management and use processes in the day to day activities of professionals involved in the health care process. In the correctional setting, these complexities are significantly compounded by the particular characteristics of the environment making an already complicated change even more difficult.

> To reach the true benefits of an EHR requires transformation of the practices, based on quality improvement methodologies, system and team based care, and evidence-base medicine.
>
> American Association of Family Physicians
> http://www.centerforhit.org/x1318.xml

Any government organization engaged in an enterprisewide transformation effort must be aware of the context within which they are working; i.e., the social, political, and economic environment and the management, policy, and technology characteristics of the organization itself and of other organizations involved in and affected by the transformation. In this case, the

[1] Perez, Arturo, 2005. "States Wrangle With Corrections Budgets", *State Legislatures*, May 2005.

context is framed by the intersection of two highly complex and critical public services with inherently different priorities – corrections and health care. The figure below illustrates this complexity by showing the intersection between a set of unique environmental factors that affect the mechanism of health care delivery and the use of health care information in a correctional setting.



This report presents 18 key findings from the analysis of the current environment of NYS DOCS outlined in the figure above. These findings in turn informed the identification of four relevant categories of benefits obtainable through the use of an EHR within the NYS DOCS, the barriers to achieving these benefits and finally, seven recommendations for next steps. The four benefit categories are as follows:

1. Cost containment through more efficient processes and resource utilization practices
2. Improved quality of care
3. Reducing the cost and increasing the quality of compliance and reporting responsibilities
4. Increased transparency

At this point, health information management and technology investment decisions as NYS DOCS are not being made within the context of a strategic plan, but rather as loosely related components. Until an enterprisewide perspective on these efforts can be developed, it is not possible to make specific determinations about the cost or value of current and future investments in delivering the expected benefits. The seven recommendations drawn from the analysis are presented as next steps for NYS DOCS as they work toward understanding the

implications of an EHR for NYS DOCS. The recommendations focus on building the capability of the organization to be successful in their effort to implement EHR functionality. They do not include a recommendation to buy or build a system; not enough information is available to inform such a conclusion nor do they provide the analysis of specific system costs. An analysis of the cost implications of an EHR for DOCS must look beyond the cost of computers, networks, and software, and take a holistic look at the organizational and management costs. As agreed by the project sponsors, this report provides insight into those costs as input into a comprehensive cost analysis.

Seven recommendations for next steps

1. Establish an executive level position within the agency whose sole assignment is leading the transition from a mixed format medical record to an electronic health record.

2. Create an enterprise "task force" with the responsibility for developing a comprehensive strategic plan for EHR implementation and given the necessary authority to implement that plan with the changes necessary for the effective transition to and long-term sustainability of an enterprisewide EHR.

3. Establish a vision for an EHR for NYS DOCS.

4. Leverage existing channels to more effectively communicate between and among key individuals and facility staff.

5. Continue current investments in the networking infrastructure within the 70 facilities and in the development of EHR system components.

6. Build human resource capabilities for knowledge sharing and collaboration.

7. Develop process and data standards development.

Chapter 1. Introduction

Health care has become one of the largest expenditures for corrections programs nationwide. In 2005, the US correctional enterprise spent approximately $3.1 billion on providing health care to the incarcerated population, an amount growing annually at the rate of 10%.[2] Similarly, in 2004, the US spent $1.9 trillion on health care, an annual increase of 7.9%, representing 16% of the national GDP.[3] This alarmingly fast increase in health care spending has prompted the correctional community and the health care community in general to look for new models and strategies for managing the health care environment. Health Information Technology (HIT), and more specifically an Electronic Health Record (EHR), is seen by many as the ultimate tool for improving the quality of health care delivery, lowering health care costs, and providing better information to patients and physicians. According to many, a nationwide EHR system has the potential to revolutionize the delivery of care to an increasingly mobile population and significantly reduce medical errors stemming from lack of access to complete medical records, ineligible handwriting, and discontinuance of care.

Unfortunately, the complexity associated with the transition from a paper to an electronic record, whether in civilian or custodian setting, is consistently underestimated. The complexity of this transition stems from the centrality of record creation and the management and use processes in the day-to-day activities of professionals involved in the delivery of health care. In the correctional setting these complexities are significantly compounded. The particular characteristics of the environment make an already complicated effort even more difficult. In any organization, the design of a new record format is relatively easy compared to the effort associated with changing organizational procedures and practices as necessitated by adoption of an EHR. Inserting an EHR system into the day to day activities of doctors, nurses, and medical records professionals will require them to work differently. In this case, so too will corrections officers, prison superintendents, regional medical directors, prison reception center staff, and parole officers, to name just a few.

Although there is a wealth of information about the impact of EHR systems generally, information about the impact in a custodial setting has not been studied in any systematic way. Nevertheless, EHR systems are expected to provide valuable benefits in the correctional setting, ranging from restraining growing health care costs[1], to improving public safety by eliminating travel by inmates to specialty care appointments, to improving quality of care for inmates by offering easy and timely access to a high-quality medical record.

> The New York State Department of Correctional Services (DOCS) has 70 facilities and approximately 63,000 inmates. It is the fifth largest correctional department in the country with only the federal prison system, Texas, California, and Florida exceeding it in size and complexity.

This document reports on a project conducted on behalf of the New York State Department of Correctional Services (NYS DOCS) to explore the likely benefits and associated costs of an EHR

[2] Perez, Arturo, 2005. “States Wrangle With Corrections Budgets”, *State Legislatures*, May 2005.

[3] 2004 National Health Expenditure Data. Center for Medicaid and Medicare Services.

for NYS DOCS. The project, *A cost benefit analysis of an electronic health record for NYS DOCS*, was initiated in the summer of 2005 by the former New York State Department of Correctional Services Commissioner, Glenn Goord.

The project was carried out in three overlapping phases. Phase one involved research on the EHR landscape in the United States generally and within the context of the correctional community, as well as research on the commonly agreed upon costs and benefits associated with EHR adoption and use (see Appendix A for Literature Review). Phase two focused on the development of a comprehensive description of the medical services environment in NYS DOCS. This included the identification and high-level modeling of key business processes associated with medical care in NYS correctional facilities and the primary stakeholders in these processes. The project also included an analysis of the various aspects of the medical record itself and related policies and management issues such as HIPAA and enterprisewide data standards. Phase three focused on a more detailed analysis of the policy, management, and technology issues related to the adoption of an EHR within NYS DOCS. Phase three was comprised of interviews with staff from a number of medical services units throughout the state. The challenges facing medical services unit staff as they deliver medical services to inmates and their perspectives on the costs and benefits related to the adoption and use of an electronic medical record were explored during these interviews (see Appendix B for project methodology and interview questions).

Chapter two introduces the definitional issues associated with an EHR and provides some information about current practices in health information technologies and EHR in particular. Chapter three outlines the source of many of the environmental and organizational challenges facing NYS DOCS in the transition to an EHR. The benefits of an EHR both generally and in a correctional context are introduced in chapter four together with barriers to implementation at NYS DOCS found in the environmental analysis. Finally, chapter five provides a set of recommendations designed to assist NYS DOCS in their efforts to fully realize the benefits of an EHR as well as a brief discussion of related cost estimation issues.

Chapter 2. Definitions and current practices

A search on the Web turns up many ways to characterize both an Electronic Health Record (EHR) system and an Electronic Medical Record (EMR) system (see Appendix C for industry definitions). Reconciling these characterizations and choosing one or two from among them as the focus of a particular effort requires an understanding of the core components of each. To further complicate the process, a review of the definitions and characterizations uncovered that the distinction between the two is not as clear as expected. Some imply that an EHR is built on an EMR, others suggest that the functionality of an EHR exists in a modern EMR system. Many characterize the difference in terms of how the information within the system can be used. For the purpose of this project two definitions were chosen from among many as tools to focus discussion.

> The EHR incorporates all provider records of encounters where the patient has received medical care.
>
> http://www.hipaadvisory.com/action/ehealth/EHR-reality.htm.

Electronic Medical Record

An *Electronic Medical Record* (EMR), as described by the American Health Information Management Association (AHIMA) is an electronic system to automate paper-based medical records. It contains only clinical/medical data, has information shared within a unit, an ability for electronic progress notes and charting, integration of electronic lab results, and has role-based secure access and use.

Electronic Health Record

An *Electronic Health Record* (EHR) as described by the Healthcare Information and Management Systems Society (HIMSS) is a system that incorporates a fully functioning EMR, has information shared across units, and has decision-support functionality. It is a real time, patient centric information resource for clinicians and administrators, provides secure, reliable, role-access to patient health record information, automates and streamlines workflow functions, incorporates security and identity management policies, and captures and manages episodic and longitudinal EHR information. It is the primary information resource during the provision of patient care, has workflow management functions, institutes point-of-care data collection, and integrates laboratory, radiology, and pharmacy systems. The system captures data used for continuous quality improvement, utilization review, risk management, resource planning, and performance management. In addition, it captures the patient health-related information needed for medical records and reimbursement and provides longitudinal, appropriately masked information to support clinical research, public health reporting, and population health initiatives. Finally, it supports clinical trials and evidence-based research.

These definitions highlight the perspective that an EHR is not a replacement for an EMR, but in fact builds on the structure and content of an EMR. An EMR is essentially a repository of clinical data. An EHR draws on the EMR as its central data repository of clinical data and enhances the use of that data through additional capability as highlighted in the definition above. The identification information within the EMR is used to connect records across multiple systems. A potentially useful analogy is the more familiar environment of Walmart. Walmart keeps a record of each financial transaction with a customer. Each entry has utility both as evidence of the specific transaction but also for other purposes such as examining purchasing patterns of individuals and demographic groups over time. For example, this additional

capability can be used to assess the impact of new product displays on buying patterns. In a health context, the capability to connect practice to outcome represents new ways to use information from past practices to inform future programs. An EHR could be used, for example, to make assessments of the impact of regular checkups on the occurrence of specific illnesses; providing health care professionals with new ways of informing decision making and planning.

An analogous environment
Transaction databases and customer relationship management tools

A transaction system is used to keep track of all exchanges between a customer and a company. The same company might also have a customer relationship management system that draws on data from the transaction system to inform customer relationship activities, and purchasing trend analysis and product development.

New opportunities to connect information and information systems has resulted in increasingly sophisticated approaches to capturing, managing, and using health care information. Evidence of these new opportunities can be found in the increasing investments in Health Information Technology (HIT) initiatives throughout the public and private sector. Of particular interest here is what can be learned from these initiatives in general, and from those in corrections specifically. The following two sections of this chapter which present summaries of the investments being made by the US federal government and within the correctional community in selected states, are provided as examples of current efforts.

Health IT investments at the federal and state level

In the fiscal year 2004, the federal government spent $900 million on 79 federal HIT initiatives. The 109th Congress introduced more than 50 bills related to HIT, while 38 state legislatures introduced 121 bills in 2005 and 2006 calling for the use of health IT to improve patient care.

Recognition of the increasing amounts of money being invested in HIT, the potential benefit of a nationwide EHR system, as well as the tremendous obstacles associated with such effort, has resulted in the creation of a National Coordinator for Health Information Technology (NCHIT) under the auspices of the U.S. Department of Health and Human Services. The NCHIT is responsible for coordinating federal activities relating to health information technology, with the goal of establishing a Nationwide Health Information Network that would link disparate health care information systems together to allow patients, physicians, hospitals, public health agencies, and other authorized users across the nation to share clinical information in real-time under stringent security, privacy, and other protections.

The most conservative estimate is that 86.6% of physicians in small practices will be using EHRs in 2024. In other words the goal of universal adoption will take more than twice as long as desired.

Ford, E., Menachemi, N., Phillips, T., (2006) Predicting the Adoption of Electronic Health Records by Physicians: When will Health Care be Paperless? *Journal of the American Medical Informatics Association,* 13(1) 106-12.

Unfortunately, progress is impeded by the numerous obstacles facing successful implementation of a national system. These barriers range from the need to develop nationwide standards for health information, to technological obstacles to interoperability across vast number of agencies, private companies, hospitals, and clinicians, all with different systems and different levels of technological capabilities, to legal questions about privacy, security, and data ownership. Recognition of the lack of progress is resulting in various responses; some involve systematic

study of the reasons why progress is slow, others involve individual states launching their own efforts. A recent study published in *The Journal of the American Medical Informatics Association* contributes to this discussion by drawing attention to the lack of progress being made in EHR initiatives and includes a set of barriers facing small practice environments.[4]

Many states have launched their own statewide initiatives aimed at creating interoperable health records system for their citizens. New York for example now has a Health Information Technology Work Group tasked with coordinating New York's effort on this front with those of the federal initiative. Seven states have completed their planning and begun implementing state-level regional health information organizations, with 28 more states planning to do so as well. Some of the most notable efforts include California's $240 million investment into HIT aimed at having 100% electronic health data exchange in the state within ten years; New York state's $52.9 million in grants to 26 regional health networks statewide as part of its Health Technology Initiative focused on increasing the use of EHR's; and Rhode Island's $20 million initiative to finance the creation of a statewide repository of e-health records.

In addition to the federal and state-level investments, numerous initiatives focus on specific domains or communities. Each of these efforts faces its own set of challenges related to its environment. Of interest and relevance here are those efforts taking place within correctional communities. Five states and one Canadian province have been identified as leading the effort within corrections.

Health Information Technology (HIT) investments in state-level correctional facilities

Throughout the last five years, a number of correctional programs have adopted an EHR system or begun to investigate its adoption. The efforts outlined below vary greatly in size, from California with 168,000 inmates to Nebraska with 4,000 inmates, and in their approach to EHR implementation from Kentucky with a public/private/university partnership to British Columbia with its in-house open source solution. Each is useful in terms of learning about potentially valuable strategies as well as in making assessments about what might work and not work in New York State (see Appendix D for the current practice review).

California — The California Department of Corrections and Rehabilitation is planning to implement their EHR within the next few years as part of a new electronic management system, called Strategic Offender Management System (SOMS). They have completed a business process analysis of their operations, developed high level requirements, and received responses to a Request for Information. They anticipate releasing an RFP by 2007.

Florida — The Florida Department of Corrections began their EMR project in 1993 with automation of the reception process at their five state reception facilities. The Computer Assisted Reception Process (CARP) was installed later that year and now they hope to expand its implementation across the state. CARP includes features

[4] J Am Med Inform Assoc. 2006;13:106-112. DOI 10.1197/jamia.M1913.

like diagnosis, medications, provider information, and a problem list. They are reviewing other states' current practices and use of an EHR with the goal of expanding their present reception level system to a statewide EHR system by the beginning of 2008.

Kentucky The Kentucky Department of Corrections implemented a systemwide Web-based EHR system in spring 2006. The project began in 2004 as a partnership between DOC Medical Services, the University of Kentucky, and a private health care firm. The system currently captures critical data such as problem lists, medication and allergy lists and has a health care management component, decision support and reporting capabilities, order management system, and offers the means to communicate electronically between clinicians. They use wireless technology enabling them to reduce the cost of infrastructure updates.

Nebraska Nebraska's Department of Corrections is the middle of implementing an EHR system that includes a pharmacy package along with medical, dental, optometry, mental health, and substance abuse records. The EHR is equipped with features that will not be used immediately but provides capability for later integration of electronic EKG, x-ray, and other digital images.

Washington As of the date of publication of this report the Washington State Department of Corrections is waiting for their EHR proposal to clear the legislature. They have prepared their RFP and have authorized a set of standard protocols should facilities decide to begin their transition work. A set of criteria for those facilities interested in setting up an EHR system at their location has been issued in an effort to ensure systemwide compatibility at a future date.

British Columbia, Canada

Prior to starting their EHR initiative, the BC Department of Corrections revamped their service delivery models. Their EHR, based on open source software, is a primary care, assessment, and encounter-based system. A number of acute care capabilities have been designed into the system, but are not yet operational. Pharmacy and mental health components of this EHR, which are managed by the Government and Mental Health, respectively, are operational. These two components have been running for some time and will continue to feed information into the new EHR system.

Each state is facing its own unique set of challenges in establishing the necessary building blocks of an EHR. However, there are some consistencies across states in terms of these challenges as well as in the strategies being employed to respond to them. Those found to be the most compelling are presented below.

Challenges

1. Underestimating the complexity of a transition to an EHR and therefore not spending enough time preparing, evaluating, and designing.
2. Engaging business experts soon enough to reflect their knowledge and expertise in the design both of the processes, the systems, and the evaluation of benefits.
3. User resistance to changing from paper to electronic.
4. Lack of user confidence in the reliability of an electronic system.
5. Scalability.

Strategies

1. Creation of a new management position responsible for the EHR initiative and filling that position with a person with a health services management and information technology background.
2. Creation of project teams with cross-unit representation from health services and information technology units.
3. Creation of agencywide steering committees that consist of health services, information technology, and corrections staff. Use agencywide working groups to focus on key questions.
4. Increasing investments in user training.
5. Increased user involvement in all aspects of the process.
6. Increased commitment to incorporating user feedback.

The challenges relate primarily to a lack of appreciation for the amount of time necessary to understand the complexity of the effort before embarking on a project and not talking to key stakeholders early and often enough. The strategies used to respond to the challenges appear to reflect an understanding that moving from a paper-based or a mixed format environment to an EHR is not business as usual. Strategies such as creating new leadership positions, forming of new and broadly constituted committees as venues for both decision making and planning and investing in user capability and participation appear to be delivering value to states employing them.

When examining the current practices of other states it becomes clear that each state must establish a set of strategies relevant to the context of that state. Developing new data, process, and practice standards within the 70 facilities of the New York State Department of Corrections are just a few of the hurdles facing the state. Any set of strategies employed by NYS DOCS must respond specifically to the context of New York. In the next chapter, a set of challenges facing to the implementation of an EHR for NYS DOCS are presented. The challenges are categorized by those that are environmental in nature and those that are more organizational in nature.

Chapter 3. Understanding the NYS DOCS

Any government organization engaged in an enterprisewide transformation effort must be aware of the context within which they are working; i.e., the social, political, and economic environment and the management, policy, and technology characteristics of the organization itself and of other organizations involved in and affected by the transformation. In this section we provide a brief description of some of the inherent environmental characteristics of NYS DOCS. These characteristics are unchangeable, resulting from the size and the complexity of New York's correctional system, as well as the conflicting goals of the correctional and health care professionals. The remainder of the chapter then discusses 18 key findings about the current environment drawn from the data collected through interviews with central office and facility-based medical, administrative, and information technology professionals. A variety of documents were also used in this analysis. These observations provide the foundation for the discussion of benefits presented in chapter four and the recommendations for next steps presented in chapter five.

NYS DOCS Environment

In the last three decades, the New York State Department of Correctional Services has experienced unprecedented growth, from 19,367 inmates in 1977 to just under 62,000 in 2005. Spurred partially by the crime wave of 1990's and the Rockefeller drug laws, the growth peaked in 1999 at 71,431 inmates. Currently, the New York state correctional system ranks as the fifth largest in the nation. The demographics of the population are changing as well, with the over-55 cohort growing by 137% from 2,830 in 1994 to 6,719 in July of 2006. The aging of the inmate population presents additional problems for the correctional community and is one of the reasons for increases in health care expenditures. Similarly, the female prison population grew by 445% in the last three decades putting additional pressure on the prison health care system.

The NYS DOCS consists of 70 facilities, each of which provides some form of medical health services to inmates. Each facility offers at least one of three levels of health services Several of these facilities have multiple medical programs offering different levels of service, and each has a separate security classification. Some prisons contain a Regional Medical Unit (RMU), a secure hospital-like setting for the chronically ill; others maintain infirmaries as well as specialty clinics. Primary and routine health care at the majority of these facilities is provided by NYS DOCS employees with only one facility being serviced by a private health care provider.

All of the NYS DOCS facilities also offer at least one of six levels of mental health services provided by a separate agency, the NYS Office of Mental Health. This separation is legally mandated and although the motivation behind this separation is grounded in laudable goals, it severely restricts the ability of DOCS health employees to view the complete medical history of a patient as mental health records are kept separately and are generally not available for DOCS medical staff's review. The necessity to base their treatment on incomplete medical records was often mentioned by NYS DOCS physicians as an important constraint on their ability to provide effective, consistent, and high-quality medical care to their patients.

The correctional environment is further characterized by the intersection of two highly complex and critical public services – corrections and health care. The custodial relationship between the inmate and the NYS DOCS is the defining relationship in this context. NYS DOCS is constitutionally required to provide health care to inmates and therefore, like many responsibilities assigned to public sector organizations, responsibility is fixed and specific. Additional factors from the environment contributing to the complexity of this effort include the nature of the physical environment, in particular, requirements for physical security. Security is paramount to all other considerations in this context. The constant and high volume of movement of inmates within the system and in and out of the system is also a fixed factor in the environment. The diversity of the missions and the occupational cultures of the correctional staff and the health services staff is a factor as well and often presents a challenge when decisions run counter to one or the other. The medical services workforce is also characterized by high rates of turnover and staffing shortages, stemming partially from the constraints and stress placed on them by this environment. A final notable factor framing the options of NYS DOCS in terms of medical services, is the existence of a specific and dynamic regulatory framework for medical services in the correctional community, driven largely by litigation.

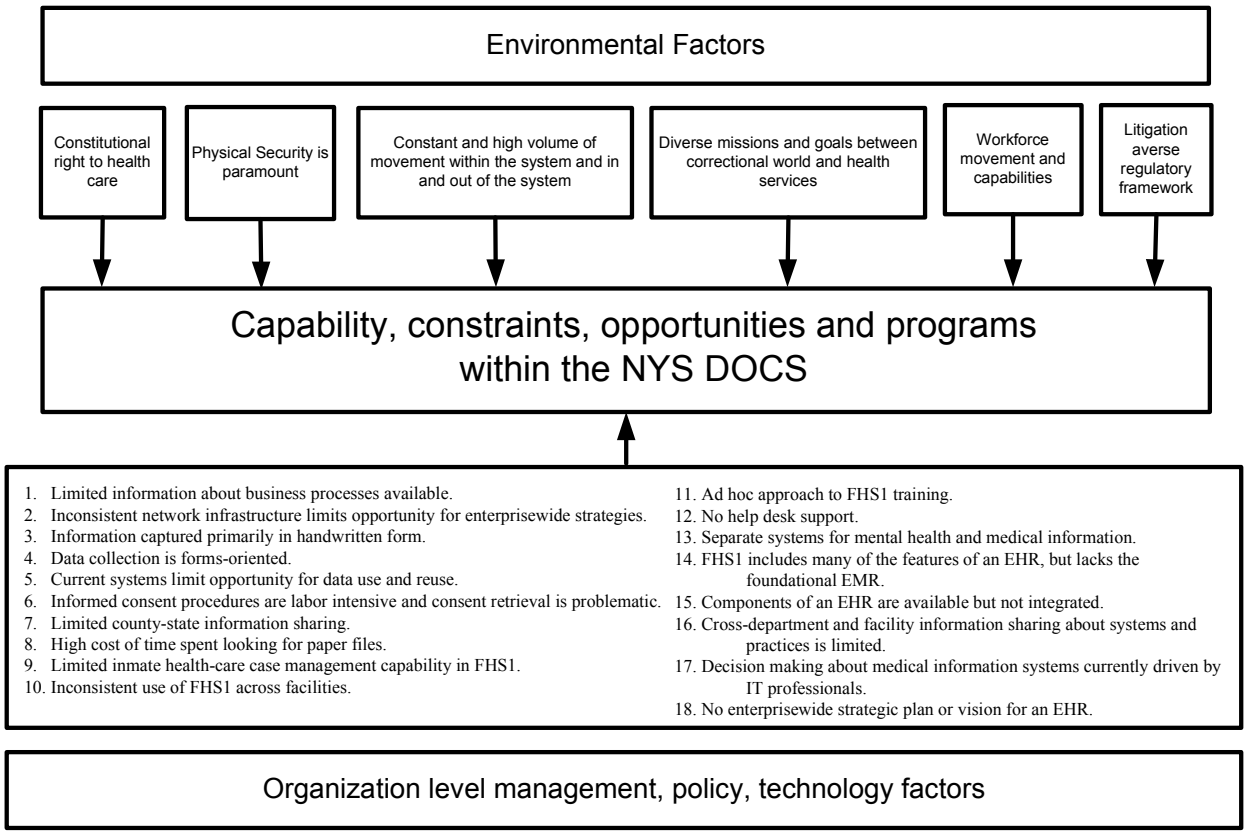


Figure 2. The complexity of the NYS DOCS

Findings

As NYS DOCS considers a transition from paper to electronic health care records, it must attend both to issues in the broader environment as well as the internal environment. The following paragraphs present a brief discussion of key findings about the current environment drawn from the data collected through interviews and group model building sessions with central office and facility-based medical, administrative, and information technology professionals. A variety of documents were also used in this analysis.

1. Limited information about business processes available.
2. Inconsistent network infrastructure limits opportunity for enterprisewide strategies.
3. Information captured primarily in handwritten form.
4. Data collection is forms-oriented.
5. Current systems limit opportunity for data use and reuse.
6. Informed consent procedures are labor intensive and consent retrieval is problematic.
7. Limited county-state information sharing.
8. High cost of time spent looking for paper files.
9. Limited inmate health-care case management capability in FHS1.
10. Inconsistent use of FHS1 across facilities.
11. Ad hoc approach to FHS1 training.
12. No help desk support.
13. Separate systems for mental health and medical information.
14. FHS1 includes many of the features of an EHR, but lacks the foundational EMR.
15. Components of an EHR are available but not integrated.
16. Cross-department and facility information sharing about systems and practices is limited.
17. Decision making about medical information systems currently driven by IT professionals.
18. No enterprisewide strategic plan or vision for an EHR.

These findings represent barriers to the successful transition to an EHR for NYS DOCS. The influence of each barriers on the potential benefits presented in chapter four and the recommendations for overcoming these barriers are presented in chapter five.

Limited information about business processes available. Phase 2 of the project with staff from the central office MIS and the Health Services resulted in the identification of eleven major business processes comprising the majority of work of the health services units (see Figure 2). Preliminary models of each of the eleven processes were developed through a series of group model building sessions. (See Appendix E for preliminary analysis of business processes)

The specification of these eleven processes is a critical step in the analysis of the costs and benefits associated with the implementation of the EHR. To fully model the potential impact of an EHR on the cost of and quality of medical services it is necessary to know in very detailed ways how that EHR will specifically impact the work of medical services units. The eleven models provide a core tool for use in the detailed analysis of that impact. The eleven models however, do not include the full range of administration activities related to managing a medical

services unit, nor do they include the range of analysis and reporting responsibilities related to public health responsibilities of the medical services staff. Therefore, in phase 3, additional data collection about the nature of the work carried out within the medical services units and the conditions within which that work is conducted was determined to be necessary before moving to a full cost and benefit analysis. This additional data collection was launched with a focus on capturing data about how medical services staff in a range of facilities capture and use information and technology in the process medical services to inmates and in responding to agency management responsibilities related to the provision of those services. During these visits the models of the eleven business processes were shared with medical services unit staff at each state facilities All staff concurred that the eleven business processes capture the medical services processes carried out within the NYS DOCS medical facilities.

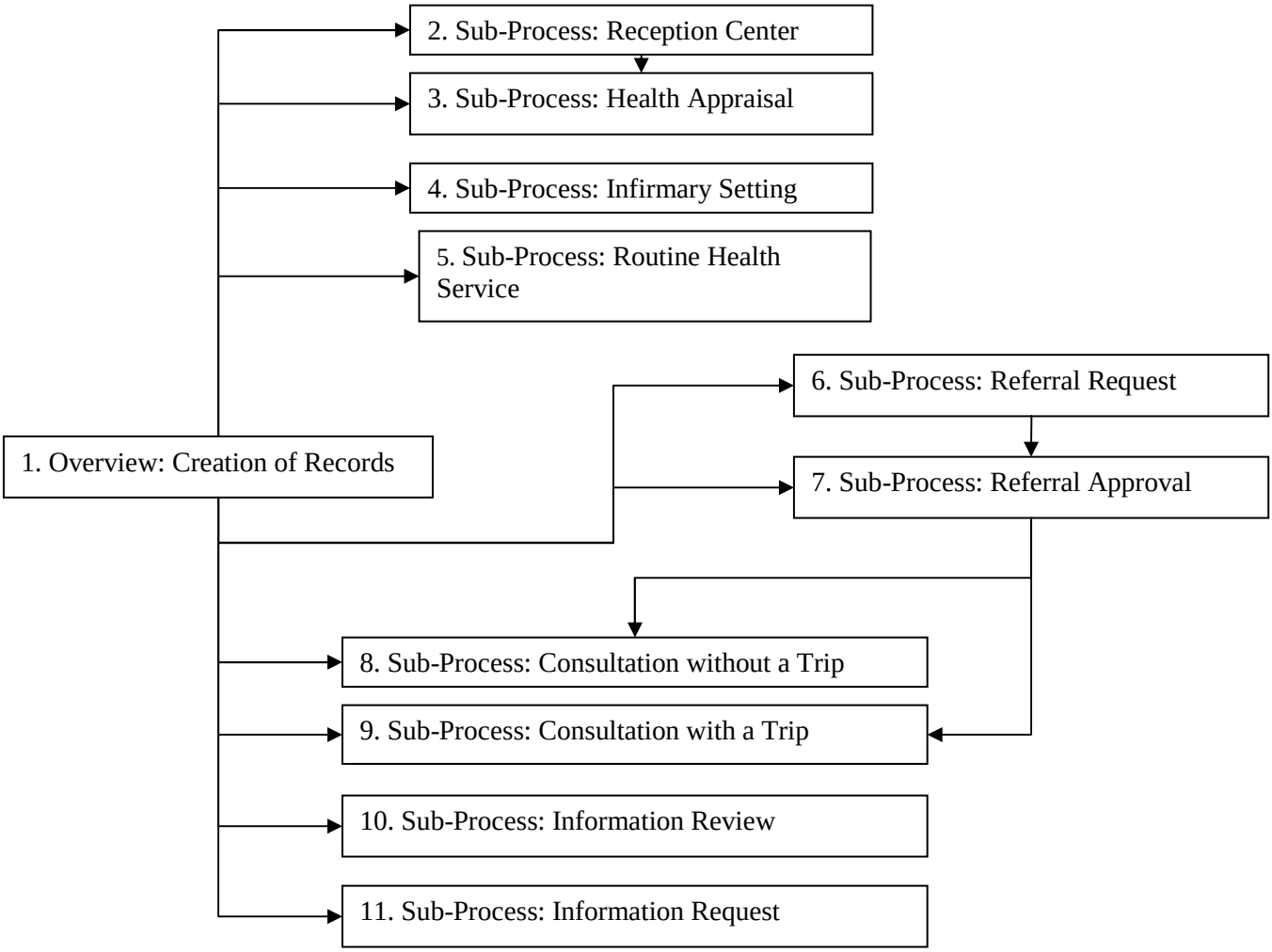


Figure 1. Medical services business processes

Inconsistent network infrastructure limits opportunity for enterprisewide strategies. One of the major infrastructure impediments to an enterprisewide EHR is inconsistent technological capabilities, including network and desktop equipment. In one of the facilities we met with a

physician who was given a desktop, however, it was never connected to the system and thus remained unused. In other cases network access to NYS DOCS information system is provided, however, the number of workstations available does not provide clinical staff with consistent access to a computer. Efforts are underway to provide a consistent technical environment across all facilities. Over the past year, 68 of the 70 NYS DOCS prisons have been wired to some extent to support client server access. Of the 68, twenty-four are completely wired and awaiting thin client installations. At this point however, ready access to agency information systems is still not consistently available to medical services staff across all facilities.

Manual information capture. Documentation of an interaction with an inmate is primarily handwritten. This manual process is prone to timeliness and legibility issues as health care professionals are forced to fill out a large number of forms by hand. Much of the information being captured is repetitive as descriptive and demographic information about an inmate are required on each form. In addition, some forms are duplicative in their content, forcing nurses to write identical information twice. Reception centers provide the best illustration of the challenges and costs related to paper-based, handwritten records. One reception center processes 10,000 inmates per year. Each inmate requires the creation of a new health record (regardless of how many times they have been incarcerated), which takes approximately 35 minutes of writing time. Assuming an average of 35 inmates per day, nurses at a reception center spend 1,225 minutes per day or over 20 hours just filling out forms by hand. This does not include the time interacting with the inmate, with other reception staff, or working with other medical or correctional staff regarding this inmate. It is simply writing time. Nurses state that the majority of the time is spent writing the same information on each form.

Data collection is forms-oriented. Inmate medical data is added to a medical record by way of handwriting information onto a pre-designed form. There are over 70 forms used to capture inmate health data. In addition to these 70 forms, some facilities have created and are using their own forms that serve various data collection purposes. An internal Forms Committee is responsible for reviewing forms and their use. Although the committee has made some progress in reducing the number of forms, there is still limited overall understanding about why particular information is captured.

In general, new forms are created as a standard response to new regulatory requirements to support the data capture necessary to comply with those requirements. This has resulted in enormous paper files containing duplicate information and introducing multiple levels of complexity to efforts to seek and use information both for individual care and for public health planning and decision making purposes. The information is provided primarily as illustration of the level of effort required to complete the documentation on a single encounter. For instance, at the point of entry into a facility, eleven forms are used to establish a record for each inmate; up to ten additional forms are used if an inmate is admitted to an infirmary, four additional forms are used for inmates with HIV, and up to fifteen additional forms are used for those inmates admitted to an RMU.

Current systems limit opportunity for data use and reuse. Dependence upon paper records as the primary repository of medical information about a single individual limits the opportunity for use of that data for both for direct care of that individual and for other purposes as well. Trend

analysis, for example, is a primary tool in monitoring impact over time of treatment protocols. The cost of producing these reports is significant due to the manual labor associated with drawing together data from individual paper records. Interviewees noted the shortcomings of the current procedures and systems in terms of their inability to obtain medical data from multiple charts for the purpose of creating annual, bi-annual or quarterly reports about the medical care of inmates.

One of the site-visit participants provided specific information about the cost of generating these reports in the current paper-based environment as well as constraints on the use of information held within those files for the purposes of program planning and decision making. This information is provided as an example of the costs of using information in its current paper-based form in the development of summary reports. The facility in this example generates approximately 15 reports each year. The process of creating these reports is labor intensive and bounded in its utility due to dependence on paper files.

The process of generating a summary report starts with the use of FHS1 to generate a list of inmates affected by the specific condition in question. FHS1, as a problem list rather than a case management system, provides an indicator of the existence of a condition, however, to get information about that condition in terms of a specific inmate, each inmate's file must be "pulled." In the facility visited each report typically includes between 50-80 inmates. Therefore, between 50 and 80 files must be pulled, which in itself is a time consuming process. Once all files (or as many as possible) are located every file is manually reviewed to capture the information of interest. Examples of the information sought in these files includes discrepancies between requested and performed tests, medication status, and check-ups. Often in this facility one full week of time is involved in the creation of each report.

Based on a yearly salary of $100,000 (in this facility the doctor did the report generation work) the cost of generating a single report for a single facility is approximately $2,000. In other words, the creation of the 15 reports for this specific facility costs $30,000 a year. In order to illustrate the potential statewide impact of this manual process, assume that each DOCS medical facility has to produce at least eight reports each year (rather than the 15 in this example). At an average salary of $50,000 a nurse could spend 8 weeks a year preparing the reports. If this occurred in every DOCS facilities (70), the total cost for preparing 8 reports per facility would be approximately $538,000.

The cost of creating required reports focusing on single variables are significant; the cost of creating comparative reports for the purposes of gathering new insights into relationships between treatments and outcomes, for example, are prohibitive. As a consequence, data within inmate files is not generally recognized as a resource to support program planning and decision making.

Informed consent procedures are labor intensive and consent retrieval is problematic. Medical staff reported that all inmates must sign a consent form during each medical encounter as evidence of informed consent. One dentist reported that inmates often must sign multiple consent forms during a single dental visit. For example, if an inmate chooses not to have root canal on an infected tooth, he must sign a form stating that he knows the condition and is

refusing treatment. On the contrary, if he agrees to the treatment, then he or she must also sign a form stating that he understands the condition and agrees to the treatment. All consent forms are then placed in the paper file and serve as a proof that the inmate was informed and either accepted or declined treatment.

Currently, the paper consent form is the only record that informed consent occurred. Ability to readily produce all signed consent forms is crucial to avoiding and responding to litigation. When talking about the possibility of an EHR system, medical staff was concerned about the impact on their ability to collect a legally valid consent that could then be stored in an electronic form. They identified this issue as one of the possible obstacles to getting fully comfortable with an electronic health record system. On the other hand, many realized the potential of being able to store digital copies of consent forms in the EHR system in terms of the ease of reproducing them in response to litigation.

Limited county-state information sharing. When an inmate is transferred from a county facility to a state reception center, his medical record, including any medical test results performed at the county, often remains at the county. Instead a state-required transfer summary sheet must be completed and transferred to the state. Due to limitations at both the county and state level, this summary sheet must be completed manually and physically transferred with the inmate. The form captures only a snapshot of an inmate's current health status and is meant to assist in the classification and movement process. Because medical test results do not travel with the inmate, tests previously performed by the county must be repeated to establish a medical profile on an inmate resulting in significant expense to NYS DOCS. The basic lab screening tests cost about $42 per inmate. A conservative cost estimate of duplicating simple lab works is approximately $922,026 per year based on an approximation of 80% of all inmates processed through reception centers in 2005 (21,953) requiring duplicate testing, with each battery of tests costing approximately $42. This cost estimate represents only lab work and does not include other standard tests such as dental exams, chest X-rays, and physicals. Costs could grow substantially if these tests were also duplicated.

Additional problems result when information provided by the county is not filled out completely, or if the county has outdated or simply the wrong version of the transfer form. These omissions result not only in phone calls by the reception staff to the county in their attempt to obtain this information, but also in additional transfers of the particular inmate and thus additional cost to NYS DOCS. For instance, one of the interviewees mentioned a case where an inmate confined to a wheelchair was transferred to a facility that would require him to climb three flights of stairs to get to his cell because his transfer sheet was missing information about his disability. After the mistake was realized the inmate had to be returned to his originating facility and a new transfer had to be arranged resulting in additional cost to DOCS.

High cost of time spent looking for paper files. Although medical files are very rarely lost, interviews with medical staff at the selected facilities indicate that it is not uncommon for nurses to spend two hours a day looking for medical files. Due to the nature of the health care process in many of the facilities, files can often be in any number of locations. One site identified eight possible locations where a file might be found on any given day. Assuming an average salary of $50,000 and 260 work days a year, this equals to approximately $12,500 spent each year for each

nurse to look for paper files. At this time, DOCS employs approximately 900 nurses. Taking a conservative estimate that each nurse spends an hour each day looking for files, and assuming an average salary of $50,000 a year, the total cost of nurses looking for files equals $5,625,000. This cost is only an estimate and does not include the costs of medical record staff search efforts, or the cost of duplicating both administrative and medical tasks in case a file cannot be recovered in time for the inmate's appointment.

Limited inmate health-care case management capability in FHS1. The Population Management System (PMS) is the primary application used to support inmate management. PMS is comprised of 24 + subsystems, which provide comprehensive inmate profile information including crime and sentence data, security designation and restrictions, test data, medical data, inmate housing location, transfer history, disciplinary history, and enemies data. It supplies data to all other applications used for operational and administrative purposes.

The Health Services System (FHS1) is the subsystem designed for use in the health care process. FHS1 currently includes an inmate's medical profile and problem list, directories of medical problems, directories of DOCS-based and outside health service providers, directories of NYS hospitals and places of service, a medical hold function, a primary and specialty care referral and appointment scheduling function, a medical claims processing function, a disclosure request function and inmate classification option.

The medical information that resides within FHS1 is what is commonly known as a "problem list." The problem list is a history of encounters, illnesses, and tests for each inmate. The majority of the inmate's medical health record, however, is in paper-based files as treatment information and progress notes are not captured as part of the problem list. The problem list serves primarily as an index to information captured in the paper file. The specialty care approval process and the scheduling components of FHS1 are widely used. In addition, lab technicians use FHS1 to print their "call out" lists for security personnel who use it to help coordinate the movement of inmates internal and external to the facility. Interestingly, many of the features of FHS1 which generate the greatest value to users are features found in an EHR.

Inconsistent use of FHS1 across facilities. FHS1 is not used consistently across the 70 facilities. Some facilities have developed extensive adaptations of FHS1 for their use; in others it is rarely used. In some cases, clerks are the primary users; in others, doctors are the primary users. In one case, the administrative staff takes all handwritten information from an inmate file and enters it into FHS1 including adding events into the problem list. If multiple files need to be entered, sometimes delays occur before enough time is available to do the data entry. Within each facility there are a number of people that can enter information into FHS1 and there is no deadline for this entry. In some facilities, information is not entered into the problem list until a few days after the medical encounter and it is done by the medical clerk. In other facilities, it is entered at the time of the exam by the doctor or the nurse.

This variability is caused by a number of factors including insufficient workstations in some locations, high patient to staff ratios, resistance to use, and lack of training about appropriate and effective use of available systems. Because of the inconsistency of use, doctors do not trust the information in the system as they cannot be certain that the information in the system was

updated by the last treating physician. The medical professionals interviewed stated that medical decisions are always based on information found in the paper file rather than information found in FHS1.

Ad hoc approach to FHS1 training. A lack of a consistent strategy for training users, both new and old, on the overall information management environment and more specifically training on existing systems, policies, and procedures creates an environment of inconsistent understanding and use of available systems. When FHS1 was initially implemented, a comprehensive training program was made available. However, that was a number of years ago, and current practice appears to be that when the Information Technology Unit has time available and a facility or individual specifically requests it, a focused training session is provided. There appears to be no systematic approach to building the capability of the relevant staff in terms of either using or managing existing paper-based systems or in optimizing use of the FHS1 and other electronic systems for use in providing inmate medical care. The current approach tends to perpetuate patterns of use that may not be optimal but rather based on idiosyncratic patterns of use. Interviewees indicated that their knowledge of FHS1 was acquired through ad hoc training from their co-workers within facilities rather than through a formal training program.

Additionally, available documentation on FHS1 is dated and of limited utility. The current user manual focuses primarily on issues of screen navigation, and not on the use of the system to support the care of inmates or for use as a resource for improving health-care and administrative decision making.

No help desk support. No formal help desk strategy exists to provide facility-based users with consistent access to support in the use of these systems. Support for users of both the inmate management system and FHS1 is supposed to be provided by an informal, facility-based network of computer security coordinators and data processing liaisons, both of which are part-time, voluntary positions. According to one of the interviewees, although each facility has these resources available, users are often unaware of this option. This may be the case due to a lack of training on the systems. Users seeking assistance therefore call the individual in the central information technology unit who developed the system – taking that person away from efforts to expand or enhance systems. This help is then focused on the mechanics of the system exclusively. No formal support program is available to assist medical professionals in understanding how to fully use the systems and the information stored there.

Unable to see entire mental, medical, and pharmaceutical profile. In New York State the Office of Mental Health is the agency charged with the responsibility of providing mental health services to the incarcerated population. The consequence of the division of responsibility for health care of an inmate between the Office of Mental Health and the Department of Corrections is a physical separation of information about an inmate. This separation results in an inability to assess a full health profile of an inmate. Since medical, mental health, and pharmacy information reside in separate information systems, medical professionals lack access to all information and rarely have the opportunity to see the full picture of an inmate's mental, medical, and pharmaceutical history.

NYS DOCS is the steward of inmate medical and pharmaceutical information and the NYS Office of Mental Health (OMH) is the steward of all mental health information including psychotropic medications. Although information sharing between these agencies is restricted by NYS policies, it still presents a problem to medical staff when trying to make clinical decisions. Some information is shared by paper files, but in many cases information is not shared at all. Thus, the picture of an inmate's health status is often incomplete. One medical professional described the process of information sharing among these areas in the following way: a copy of each psychotropic prescription is sent to the inmates health unit and *pasted* to the psychiatric medication form. These documents are the only mental health medication records available to doctors and nurses treating the inmates. Sometimes a copy of mental health treatments and medications are in a psychiatric medication record that can be filed in the miscellaneous section of an inmates medical services folder.

The sharing of information between and among these agencies is a function of current public policy as well as existing agency practices and administrative processes. Changes designed to provide a more holistic view of an inmates health must be based in a review of current procedures and policies.

FHS1 includes many of the features of an EHR, but lacks the foundational EMR. FHS1 has many components of an EHR such as scheduling routine and specialty care visits and workflow functions for obtaining approvals but it lacks a central repository of medical data on inmates that would be found in an EMR. For example, the problem list shows if an inmate is a diabetic, but contains no treatment or status information. Care givers must go to the paper file to determine current status and past practice in terms of treatment, related conditions, and etc.

Components of an EHR are available, but not integrated. The agency has invested in the development of a number of systems that represent aspects of EHR functionality. These components, such as pharmacy and lab systems are or are becoming available but are limited in their utility due to a lack of integration with other systems and most specifically with an EMR. Aspects of an EHR are available, but not integrated. The present system also lacks integration with other available systems such as pharmacy, labs, and mental health. Medical service professionals must look in multiple systems to get a full picture of an inmate; paper files, the problem list, the pharmacy system, and the lab system, to name a few.

Cross-department and facility information sharing about systems and practices is limited. While the interview data and document analysis indicate the presence of a meeting structure within each department, there appears to be limited cross-departmental information flow, for example, among physicians, nurses, and health records administrators across facilities. And even less opportunity for cross-boundary communication exists between these professionals and the information technology unit. In addition, the existing meetings appear to be limited to those with managerial or executive responsibility. There are limited opportunities to share information below a certain level within the organization. Overall, the meetings were characterized as one-way information delivery sessions. Limited discussion and problem solving related to an EHR occurs within these meetings. Participants characterized the culture of the agency as one where information is shared cautiously. While they recognized the necessity of this, many observed that the practices related to information sharing about inmates and inmate management specifically,

may have been unnecessarily extended to information sharing about systems and practices used to support health care management within the medical services facilities.

Decision making about medical information systems currently driven by IT professionals. The current management model for system development of medical information systems is reflective of a more traditional application development environment where the information technology unit is the driver rather than the business unit. The implementation of an EHR requires a new model of management. Both academic and the current practices research indicate that the transition to an EHR is an enterprise transformation effort requiring data, process, and practice changes at virtually all levels of the organization. Enterprise transformations are broadly recognized as needing the engagement of a non-IT executive who is responsible to the business owners served by the systems. New systems that connect departments and facilities require a management model that involves a broad range of stakeholders from across these business units. Under the current organizational structure there is no non-IT person actively and consistently engaged in working with the central office and staff from the correctional facilities in leading the transformation.

No enterprisewide strategic plan or vision for an EHR. Although the development and use of FHS1 has bridged a gap in capability by supporting limited information sharing among facilities, there is still no overarching business focus driving EHR decision making and planning. Applications are developed in response to the identification of specific problems or gaps in functionality, rather than in response to a the transition to a fully electronic and integrated health record as part of an overall focus on Overall there does not appear to be an enterprisewide strategic plan or vision driving investments in the capture, management, and use of medical information at NYS DOCS. Many investments are being made and they appear to be serving the agency well. However, whether those investments are serving the agency in terms of contributing or detracting from the potential benefits of an EHR is unclear. Without an overall vision or plan against which design and investment decisions can be framed, the contribution to this vision and the value of these investments is unclear. A vision for these efforts should be created by the business owners of these systems working in cooperation with the both information technology and corrections professionals.

Chapter 4. Benefits and barriers

The correctional community is facing pressure to change the way it manages inmate health care. Increases in cost efficiencies and quality of care are both recognized as necessary to respond to these pressures. Pressure for increased efficiency comes from front-line health care providers and records managers as well as from executives and policy makers inside and outside of the agency. In addition to the interests in efficiency, increased pressure for accountability and capability to comply with treatment and privacy requirements comes from agency executives, political leadership in the state, and inmate and health care advocates. To respond to these pressures more effective ways to capture, use, and manage information about inmates and the care they receive must be created. This chapter presents a set of ideal characteristics for an EHR implementation for DOCS together with a discussion of known benefits of an EHR. Each characteristic and benefit is then discussed in terms of the barriers to implementation identified in the analysis. Overcoming each barrier requires new investments of money and effort from DOCS. The recommendations provided in chapter 5 outline the nature of the investments required and a strategy moving forward.

Ideal characteristics of an EHR for NYS DOCS

Implementing an EHR system is generally considered a core component of strategies undertaken to increase cost efficiencies and improve the quality of health care, including correctional health care. Two separate activities were undertaken to begin to understand what this might mean within the context of the NYS DOCS. The first was a review of current practices in EHR implementations; the second involved discussions with staff in multiple facilities centered on the characteristics of an ideal correctional health care environment with a fully functional EHR system (See Table 1). The characteristics considered ideal by NYS DOCS staff are consistent with those found in the EHR implementations studied in the current practices research in this project and outlined above. Lessons learned from this research include the need to take into account the specific conditions of the environment when considering the adoption of an EHR. This finding reinforced the collective NYS DOCS and CTG decision to shift the emphasis in this project from a system-focused cost analysis to an environment-focused analysis. In order to ensure a full understanding of the environment as input to a future comprehensive cost analysis, NYS DOCS and CTG agreed, this project should emphasize an analysis of the current

Table 1.
Characteristics of an Ideal EHR

1. Access to *all* necessary and appropriate medical information as well as identifying information.
2. Easy to use and up-to-date information entry, access and retrieval.
3. More computer terminals and points of access for staff.
4. Medical information transfer and exchange between DOCS facilities and external institutions, such as County facilities, OMH, and area hospitals.
5. A Physician Order Entry and Medication Administration system that would automatically check for entry errors and conflicts.
6. Capability to analyze and manipulate medical data for reporting purposes.
7. Portable devices for point of care data entry.
8. Archive inactive records electronically to save office space.
9. Ability to accept e-signatures from inmates where appropriate.
10. Access to medical reference information to support decision making.

environment of NYS DOCS with respect to health care information and the factors influencing the costs and benefits of an EHR.

Known benefits of an EHR

The review of current practices and an analysis of NYS DOCS staff interviews identify the set of benefits generally attributable to an EHR adoption. These benefits fall into four general categories:

1. Cost containment through more efficient processes and resource utilization practices.
2. Reducing the cost and increasing the quality of compliance and reporting responsibilities.
3. Increased transparency.
4. Improved quality of care.

The following paragraphs characterize each of these benefits in general and in the context of NYS DOCS. The closing discussions examines these benefits in terms of the ideal characteristics identified by NYS DOCS staff and barriers to change presented in Chapter three.

The implementation of an EHR will require many changes in the agency. Few if any of the changes will result in an impact exclusively on one benefit category or another. For example, the implementation of an EHR will generate time and cost savings due to reduced duplication of effort spent recreating a record. That in turn creates the potential for an increase in the quality of care if time is now spent caring for inmates rather than search for a record, and it reduces the cost of compliance and reporting due to ready and reliable access to information, which in turn increases transparency. However, the analysis of the environment highlights the conclusions that significant management, policy, and technology changes are necessary to ensure that the process of creating and managing a record takes full advantage of the technology and that work practices respond to those changes. Given the lack of communication within and between facilities about work practices, for example, and how current systems are or might be used to support those practices, it is clear that significant new investments in organizational communications and staff skills are necessary for the benefits of an EHR to be realized.

Benefits of an EHR to the State of Washington

The State of Washington identified the following set of benefits to EHR adoption in correctional setting: "1) Increase the time practitioners have for direct patient care by eliminating manual and duplicate charting. This will enhance staff morale and productivity and reduce turnover. It will also support accurate and timely recording of clinical data. 2) Support the quality and consistency of care through clinical decision support. Increase patient safety with tools such as automatic screening for drug interactions and for allergies. 3) Manage offender health care costs through improved control of all cost components, particularly medication costs. Provide more accurate and timely data for administrative management and oversight needs. 4) Support DOC's public safety mission by providing more timely and complete information for classification, risk management and medical transition planning. 5) Effectively exchange patient health information with local jails. This supports continuity of care, collaboration on public health issues, and increases the efficiency of DOC's reception process. 6) Keeping up with state and Federal health privacy law compliance requires additional staff. An EHR will be a 'staff multiplier' by enhancing existing staff productivity."

Electronic Health Records Feasibility Study prepared by Starling Consulting Inc. for the Department of Corrections of the state of Washington.

Cost containment through more efficient processes and resource utilization practices

The potential of an EHR to impact the cost of inmate health care is significant. To fully understand the potential impact of an EHR on process efficiencies and resource utilization practices, each process must be examined in great detail. The eleven processes comprising inmate interaction with medical services units provide the starting point for this detailed examination.

Some of these processes are highly administrative in nature and therefore more traditional process reengineering activities., i.e., examining the specific impact on information seek time when the record is electronic versus paper, examining the cost of generating a trend analysis when the necessary detail data is located in an online database versus individual paper files, will identify the full cost containment opportunities. A close look at Process # 2, The Reception Center, for example, identified the potential impact of automated work processes and integrated records systems on staff time for both seeking and then recreating records; staff time associated with seeking and then reproducing information through duplicate testing; staff time and testing costs associated with assessing and then recreating information through duplicate testing.

Additional administrative processes such as resource management were not modeled in this project but provide significant additional cost containment opportunities. The cost of medication is one of the factors contributing to the rapid increase in health care costs. While DOCS staff can do little to impact the price of medication it can through the use of an EHR work to eliminate waste. Medical services staff are currently making an effort to manage waste in the regard, however, the process for doing this is manual in nature. For example, one of the pharmacy employees interviewed stated that every month she prints out a list of the ten most expensive medications and manually checks them against the list of prisoners to make sure that she is not dispensing medicine to an inmate who is no longer at her facility. An EHR system with an integrated pharmacy system would alert a pharmacist of inmate transfers in real time and if so designed would automatically remove that inmate's prescriptions from the weekly prescription list thus immediately eliminating the disbursement of medication to an inmate no longer present at the facility. A pharmacy system is under development at NYS DOCS so opportunity for this kind of resource utilization management may not be far off; if of course, the pharmacy system is integrated in some way with the population management system.

Some of the processes involve a mix of administrative tasks and direct care delivery. Changes to these processes will be among the most challenging as they require changes in the work practices of the medical records staff and the medical professionals as well as changes in inmates in terms of the care setting and the nature of caregiver to inmate interactions. In Processes # 3, 4, and 5, all involving direct interaction with the inmate in a appraisal or clinical setting, electronic access to detail data about a patient represents the opportunity to reduce the length of time required for a appraisal or clinical assessment itself, as well as to reduce the time required after the specific event to capture data as part of the record of that event. It will however, require everyone involved in these processes to change in some way. Other benefits such as quality improvements and improved recordkeeping are related to these changes as well.

Improved quality of care

Interviews with health care staff identified a shared commitment to providing quality health care to inmates and a shared concern about the potential impact of high quality, or in some cases low quality care, on the public as a whole. Data on offender populations shows they are proportionately sicker than the general population on virtually any measure of mental illness and chronic and communicable diseases including tuberculosis, Hepatitis B and C, HIV/AIDS, drug and alcohol addiction, STDs, hypertension and others. Coupled with high mobility and tendencies to engage in high risk behavior, the 28,000 inmates released in 2006 pose a significant risk to the communities to which they return upon their release from prison.

Many investments in care quality have been made over the years by NYS DOCS. FHS1 is an example of the investment in information systems designed to increase quality of care. The core feature of FHS1, the problem list, was initially envisioned as a strategy for providing a summary level of information about an inmate's condition. This list is used today infrequently due to the lack of detail data such as diagnoses, medications and progress notes. According to interviewees a workaround has been created for this as well. For example, in chronic care situations clinical staff often rely on a "human tickler" system rather than a formal medical record to transfer information about inmate status.

In place of the FHS1, interviewees envision a system with a host of new features including a full medical record, medical reference information to support decision making, physician order entry and medication administration systems with automated review for entry errors and potentially harmful drug interactions. Eliminating legibility issues and integrating information from multiple systems were identified as two ways to improve care quality. The adoption of an EHR, with these and other related capabilities was recognized by interviewees as a critical resource for ensuring quality care for inmates and therefore, reducing the potential negative impact of released inmates on the health of the public.

Little opportunity currently exists to improve the quality of care for inmates through systematic and regular analysis of data found in medical records. While the interviews identified impressive strategies employed by medical services staff to ensure quality care, the constraints of the current environment limit the potential for improvements. As indicated above, the cost of producing analytical reports in the current paper-based record environment is prohibitive. Therefore, report generation is generally administrative rather than planning or problem solving in purpose. In addition to features that support public health analysis, interviewees expressed interest in a system with the capability to trigger care events such as prompts for administering prevention medications and scheduling follow-up care for patients with chronic and communicable diseases.

The interviews provided further evidence of the commitment of medical services staff to quality care. We heard about many techniques developed over the years as workarounds to limitations of the paper-based records environment. The story about the use of test results in an infirmary appointment highlights the need for workarounds and the issues created by them. Locating a paper medical record does not mean the search for information is over. Information needed for a particular appointment must then be located within the file; some of which contain hundreds of documents. Certain information such as progress notes and notes from the last appointment are usually easy to find; the situation becomes more complicated, however, if results from past tests,

such as MRI's, are needed. Often these results are not located in the file due to delays in processing or filing. The proper procedure for tracking down a test result not found in the file is for the floor nurse to call the records clerk and have a copy of the original test results, received from the trip nurse upon delivery of the results to the facility, brought to the examining room or nurses station. According to the nurses interviewed, getting a copy often takes a significant amount of time, often more than the time allotted for the appointment. So to ensure inmates receive treatment during their scheduled appointments and to avoid the overhead of rescheduling appointments – trip nurses keep copies of test results in a parallel set of files. When a test result can't be located in an inmate's file during an appointment the floor nurse calls the trip nurse instead of calling the records room where the original should be when its not in the file. The trip nurse then has to locate the specific test result, make an additional copy and deliver it to the floor nurse within the time allotted for an the appointment. This process is time consuming and results in high levels of frustration among nurses and results in reliance on copies of documents rather than on original documents.

Another factor in the environment identified as negatively contributing to quality of care is the turnover rate for medical staff. Interviewees discussed feelings of frustration and stress as likely causes of high turnover. Some of this frustration stems, according to interviewees, from the inherent characteristics of the correctional health care environment as outlined above in chapter three, some is related to the frustration stemming from other factors such as the constant search for medical files, the number of phone calls to other facilities in attempts to recover an inmate's medical file and the need to rewrite the same information on every form contained in the medical record. Interviewees were cognizant of the capabilities of new medical records systems and EHRs and were frustrated by the lack of access to these tools within the NYS correctional health care environment.

Reducing the cost and increasing the quality of compliance and reporting responsibilities

The potential of an EHR to reduce the cost of generating current reports and to increase the quality of those reports is great. An EHR enables new ways of capturing and using information in compliance reporting and in analysis of program and service impacts for improved decision making and planning. The interviewees described in detail the level of effort and the costs associated with meeting their reporting requirements. Further, they noted given the level of effort associated with generating required reports, little if any opportunity remained to engage in data analysis. Interviewees recognized that the proactive management of the health of inmates becomes practical through the regular use of data about things like the impact of treatments on inmates by facility, age, and health history, that would now be readily available in an electronic record.

New legislation often based on past court decisions, creates new care requirements. New practices in place at Bedford are an example of this. Complying with these requirements as well as providing evidence of compliance is challenging given the current information systems. Paper-based records must be used to make decisions about who is impacted by the new care requirements, paper records of treatment must be maintained about the delivery of that care, and paper records must be used to provide evidence of treatment. Interviewees recognized the potential of an EHR to facilitate the kind of reporting that currently must be manually done by

nurses and in some cases doctors. These reports may still need to be generated by these expert professionals, however, the time required to generate them will be considerably less, and conceivably the quality will be increased.

Increased transparency

Transparency as an issue in the health care arena is receiving much attention lately. According to Bill Berenson in his article "Health Care Transparency Defined" [5] transparency means making information available to consumers, that previously was not available to them. For the public, this may include the prices for common health care services with a specific physician, as well as clinical quality and efficiency information on physicians; in the correctional arena it has more to do with accountability. Accountability in this case has to do with professionals or organizations being called upon to justify their actions. Transparency ensures that information necessary to assess practices against criteria embodied in the normative standards of a particular profession, in this case correctional health care, is available. People can defend themselves against accusations of malpractice of any kind when they can show they behaved in an ethical fashion consistent with professional standards.[6] Documentation, in this case, the medical record, is necessary to ensure that the actions taken by medical services personnel are "transparent" or easily assessed. NYS DOCS medical services staff, as public health professionals, are ultimately responsible to the people they serve. Therefore, transparency and accountability generally mean that processes and criteria for decision making are available for public inspection.[7]

Transparency has the potential to increase confidence in the system, on behalf of both the inmates and the medical services professionals as well as other key stakeholders. It represents an opportunity for an increasing level of oversight on local practices to ensure consistency of approach and care. Creating a more transparent environment depends in part on the implementation and use of new information systems, but it also depends in large part on an organizational commitment to knowledge sharing and openness. The primary challenge facing DOCS in this case is the inherent conflict created between the need for a secure environment created in part by an expectation of limited information sharing and the need for an open environment that encourages consistent and purposeful knowledge sharing.

EHR systems are credited with contributing to the avoidance of litigation in a number of the current practice states. This is in part because of its potential to improve the overall delivery of inmate health care as outlined above. In addition, it stems from the transparency creation by consistent and easy access to a complete record about the care provided to an inmate. Access to the official record is uniquely important in the correctional health care environment. The need to have the most current information about a patient is an important part of quality care in any environment. In a non-correctional environment missing information can be sought from the patient. In the correctional environment however, this is problematic. Interviewees characterized the consequences of seeking information from the inmate themselves as a way to fill gaps in the record; information gaps between the doctors, nurses, and specialty physicians cannot be filled by inmates. Inmates have been found to use these gaps to manipulate a situation and the process

[5] http://detroit.sbnonline.com/National/Article.aspx?Category=148&CID=9767&CompanyID=19
[6] Gellermann, W.; Frankel, M. S.; and Ladenson, R. F. (1990). *Values and Ethics in Organization and Human Systems Development.* San Francisco: Jossey-Bass.
[7] Ibid.

by misrepresenting his or her condition and past care provided by medical services units. Current processes and technologies create the conditions for this to occur. Another workaround strategy created to avoid the need to ask the inmate to fill in the gaps has resulted in the practice of creating duplicate files for specialty physicians; this then creates its own host of problems. An EHR system has the potential to reduce liabilities related to these activities by providing ready-access to an inmate's record for use in fact-based communication about that inmate from a single, reliable, and credible source. The gaps in efficiencies of treatment processes and practices and the challenges related to the effective use of consistent, reliable and credible information about an inmate are clear to medical services staff and to inmates themselves; thereby creating conditions for litigation to be successful.

Barriers to an EHR for NYS DOCS

The findings presented in chapter three represent a set of barriers to implementation. Table 2 presents an illustrative look at the ideal characteristics in terms of benefits and barriers as a resource for use in investment decision making and planning by DOCS. The table maps several of the characteristics of an ideal system as described by DOCS staff to the benefits and barriers of that characteristic. For example, providing users with access to all necessary medical information as well as identifying information has the potential to generate value in all four benefit categories. Therefore, investment in this characteristic appears to be highly recommended, however, the table also highlights the many barriers to implementing this characteristic in NYS DOCS. The barriers include policy, management, and technology challenges. Providing more computer terminals and points of access for staff, by itself, has many fewer barriers, however, it represents much less overall benefit. An analysis of the cost implications of an EHR for DOCS must look beyond the cost of computers, networks, and software, and take a holistic look at the organizational and management costs. A consideration of the barriers to achieving each of the ideal characteristics begins to provide some understanding of the extensive accompanying organizational costs associated with an EHR. The recommendations provided in chapter five layout a set of organizational changes necessary to generate the capability necessary for the transition to an EHR for NYS DOCS.

Table 2.
Linking benefits and barriers of an ideal EHR for NYS DOCS
An Illustrative Sample

Ideal characteristic	Benefit	Barriers found in the NYS DOCS environment
Access to *all* necessary and appropriate medical information as well as identifying information.	• Process efficiencies • Reducing the cost and increasing the quality of compliance and reporting responsibilities • Increased transparency • Improved quality of care	• Separate systems for mental health and medical information. • Inconsistent network infrastructure limits opportunity for enterprisewide strategies. • Information captured primarily in handwritten form. • Data collection is forms-oriented. • Current systems limit opportunity for data use and reuse. • Components of an EHR are available but not integrated.
Easy to use and up-to-date information entry, access and retrieval.	• Process efficiencies • Reducing the cost and increasing the quality of compliance and reporting responsibilities • Increased transparency • Improved quality of care	• Information captured primarily in handwritten form. • Data collection is forms-oriented. • Current systems limit opportunity for data use and reuse. • Ad hoc approach to FHS1 training.
More computer terminals and points of access for staff.	• Increased transparency • Improved quality of care	• No enterprisewide strategic plan or vision for an EHR. • Inconsistent network infrastructure limits opportunity for enterprisewide strategies.
Medical information transfer and exchange between DOCS facilities and external institutions	• Cost containment through process efficiencies • Increased transparency • Improved quality of care	• FHS1 includes many of the features of an EHR, but lacks the foundational EMR • Current systems limit opportunity for data use and reuse. • Components of an EHR are available but not integrated.

Ideal characteristic	Benefit	Barriers found in the NYS DOCS environment
A physician order entry and medication administration system-automatic checks for errors and conflicts	• Cost containment through process efficiencies • Improved quality of care	• Components of an EHR are available but not integrated. • No enterprisewide strategic plan or vision for an EHR. • Inconsistent network infrastructure limits opportunity for enterprisewide strategies.
Capability to analyze and manipulate medical data for reporting purposes	• Cost containment through process efficiencies • Reducing the cost and increasing the quality of compliance and reporting responsibilities • Increased transparency • Improve quality of care	• Decision making about medical information systems currently driven by IT professionals. • Cross-department and facility information sharing about systems and practices is limited. • FHS1 includes many of the features of an EHR, but lacks the foundational EMR. • Components of an EHR are available but not integrated. • Inconsistent use of FHS1 across facilities.
Portable devices for point of care data entry	• Cost containment through process efficiencies	• Inconsistent network infrastructure limits opportunity for enterprisewide strategies. • Ad hoc approach to FHS1 training. • Inconsistent use of FHS1 across facilities.

Chapter 5. Recommendations for next steps

The transition to a fully electronic health record from a mixed format record touches every process and person involved in inmate health care. This involvement runs the gamut from the classification and movement process at the reception centers, to sick calls, health records management, public health analysis, discharge planning and beyond. The impact is far-reaching and not well understood. The transition, therefore, requires organization wide attention and leadership. The seven recommendations presented below reflect a need for an enterprisewide perspective on this transition. At this point, none of the recommendations involve moving forward with the purchase of new technologies or systems considered to be an "EHR." The recommendations focus rather on building the capability of the organization to be successful in future system and application investments. At this time, knowledge about the advisability of one system investment versus another is insufficient to support recommendations in this area. However, the analysis did generate sufficient knowledge to support a set of recommendations that if followed will generate the knowledge necessary to make specific recommendations about hardware and application investments.

Seven recommendations to set the stage for an EHR for NYS DOCS

1. Establish an executive level position within the agency whose primary assignment is leading the transition from a mixed format medical record to an electronic health record.
2. Create an enterprise "task force" with the responsibility for developing a comprehensive strategic plan for EHR implementation and given the necessary authority to implement that plan with the changes necessary for the effective transition to and long-term sustainability of an enterprisewide EHR.
3. Establish a vision for an EHR for NYS DOCS.
4. Leverage existing channels to more effectively communicate between and among key individuals and facility staff.
5. Continue current investments in the networking infrastructure within the 70 facilities and in the development of EHR system components.
6. Build human resource capabilities for knowledge sharing and collaboration.
7. Develop process and data standards development.

The recommendations lead off with the appointment of an executive provided with the authority to move the agency toward an EHR. This individual must have authority to work at the highest levels of the agency to both make and inform decisions about the management, policy, technology challenges facing NYS DOCS in this process. The remaining recommendations

address issues relevant to the work of this executive and of the agency. These include the creation of new decision making bodies and steering committees and a commitment to new levels of knowledge sharing and communication, human resources development, and infrastructure. Each recommendation alone if implemented will provide value to the agency, however, they should be seen as a companion set which when taken together, provide the best opportunity for progress toward the realization of the benefits achievable through the successful implementation and use of EHR at NYS DOCS.

Each recommendation responds to the multiple management, policy, and technology benefits and barriers identified throughout the project. The complexity and interdependence of the benefits from and barriers to success preclude the presentation of the recommendations in terms of single benefits or barriers. Therefore, a rationale for each recommendation which speaks to the potential of the recommendation to mitigate challenges to an EHR initiative based on management, policy, and technology factors is provided. This rationale outlines the contribution each recommendation can make to realizing the benefits of an EHR. The recommendations are followed by a brief discussion of the cost implications of the recommendations as well as observations about what must be done to determine detailed cost estimates associated with each recommendation.

1. Establish an executive level position within the agency whose priority assignment is leading the agency in a transition from a mixed format medical record to an electronic record.

Action: Establish a full-time, executive level position responsible for an enterprisewide transition from a paper-based to an electronic health record including all the necessary management, policy, and technology changes. This requires an individual who can work effectively with medical services unit leadership, IT leadership, as well as facility and agency leadership. The changes necessary in terms of every-day work practices of each individual requires the authority of an executive level position to both compel leadership in each of these areas to participate in the planning and decision making, as well as in carrying out necessary management, policy, and technology changes.

Rationale: The data indicates that while there appears to be agencywide recognition of the criticality and the benefits of the transition from paper to electronic medical records, there has not been, up to this point, recognition of the complexity of this transition process. There is a lack of ownership of this issue, resulting in inability of the organization to muster the necessary energy and commitment to make such change possible. The absence of change following the 1999 internal analysis of an EHR system perfectly illustrates this point. The approach taken up to this point is more reflective of those taken as organizations move from one version of software to another, or the automation of a single or stand-alone set of business processes. Within the context of the NYS DOCS for example, leadership and responsibility for the implementation of the pharmacy system has been primarily

the responsibility of the information technology unit staff rather than of medical services personnel.

However, the nature of the changes envisioned requires a different approach. It requires leadership from a person who has knowledge and experience with bringing an organization from a paper-based to an electronic work environment Even more importantly, however, this person must have sufficient authority to affect the changes necessary.

Throughout the nation organizations are making investments in a new kind of professional. Some might call it a new information technology professional, other might call it a new kind of health care professional. Regardless, these new professionals, sometimes call health information technology coordinators are responsibility for building coalitions among the people, teams and enterprise who are involved in this process of change. In many states these new positions are being created as part of state-wide executive orders for new investments in health information technology infrastructures. A search of the web reveals dozens of executive orders requiring the creation of these capabilities. Each of these efforts including New York's own, provide some value to NYS DOCS as they work to design the organizational capability necessary for successful EHR implementation.

2. Convene an enterprise "task force" charged with the responsibility for developing and implementing a comprehensive strategic plan for an EHR for NYS DOCS.

Action: Convene an enterprise health information task force charged with working with the "health information" executive to set systemwide policies and data, process, and practice standards and to manage the implementation of those policies, standards, and practices throughout the transition process and in the ongoing use of an EHR.

The transition to an EHR represents an organizational transformation. The transition process requires a new model for working across boundaries between medical services staff and the information management staff as well as many others across the agency. An EHR task force will serve as the focal point for this effort. This group must have the warrant as well as the necessary representation to develop an enterprisewide vision for an EHR for the NYS DOCS, and the authority to draw on the breadth and depth of experience of its members to develop the high-level as well as detailed plans for moving forward.

This body should have the responsibility to identify necessary policy, management, and technology changes in the enterprise and the authority to carry those changes through to completion. For example, to move forward with the

creation of an EHR, as well as its standard use, the agency must define and implement data and process standards. These standards setting processes should be among the first activities of the task force.

Rationale: Currently, no single body contains the necessary expertise and authority to serve as a focal point for the decision making and planning necessary for this level of transformation. Information sharing and decision making related to overall medical services programs as well as facility specific issues and practices occur in places such as quarterly regional medical directors meetings. Information sharing and decision making related to information management and use and agency information systems takes place in several central office and facility based meetings. However, no group currently in place has the full range of professionals necessary to engage with the full range of issues related to the transition to an EHR. Medical services professionals and information systems management professionals must work together on this effort. No such forum where that can happen exists at this point.

Further, no group, of those already in place, has as its primary responsibility the transition of the NYS DOCS from its current state to an enterprisewide EHR. The transition requires, for example, a shift from a forms-oriented perspective to a data-oriented perspective. This shift must be driven by the information capture, use, and management practices of the medical services professionals, and must be informed by the data and process standards development experiences of the management information systems staff. Under the leadership of the new health information executive and through the use of this task force, these diverse professionals can be brought together in a coordinated and consistent way to develop a plan for moving forward on this critical agency priority. Further, this body can engage in the kind of knowledge sharing and reflective assessment that will result in new knowledge being created and used to refine project plans and expectations.

3. Establish a vision for an EHR for NYS DOCS.

Action: Use the new task force to develop an enterprisewide understanding of the nature, purpose, and value of an EHR; essentially a vision for an EHR at NYS DOCS. Use this to set priorities, make tough choices, and to evaluate investments and implementation progress.

Rationale: Research on success and failure factors in information technology initiatives in the public sector, done both at the Center for Technology in Government and elsewhere, shows that a lack of understanding of the problem and the potential value of various solution strategies is a barrier to success. The current practices research also makes this point – states found that a lack of investment up front in terms of building understanding of the current environment and of the nature and value of an EHR in terms of changes to the current environment caused problems

in the project efforts. Teams reporting this found they needed to drop back and make the investments necessary to build understanding across the enterprise. These research findings are particularly relevant here as the interview data indicates a broad lack of understanding of what an EHR is and what must happen at the agency for one to be implemented. In fact, through our interviews with the various personnel ranging from reception nurses to the regional medical directors, it has become clear that no one is even aware of the fact that NYS DOCS is considering the implementation of an EHR. Thus developing a common vision shared by NYS DOCS personnel is a crucial step toward a successful implementation of an EHR.

4. Leverage existing communication channels to more effectively share knowledge among all stakeholders.

Action: Use existing communication channels and establish additional ones to promote systemwide coordination and knowledge sharing of the benefits, challenges, and nature of the transition to an EHR. Key agency staff at all levels must both understand the nature of the changes necessary in the transition to an EHR and participate in the change process. To ensure productive engagement of staff, i.e., to capture the vast practice and process knowledge held by these individuals they must be provided with useful information about the nature of the changes necessary.

Rationale: Research conducted at the Center for Technology in Government and elsewhere shows that organizations with strong communication competencies have strong relationships between information users and organizational leadership, and resources to support collaboration, including staff, budget, training, and technology. A critical component of an EHR is standards; at NYS DOCS new data, process, and practice standards are necessary as part of this transition. To be effective, standards setting processes must be based on effective knowledge sharing about current work practices and related information capture, use, and management.

The interview data indicates that although there are a number of formal communication mechanisms such as monthly and quarterly meetings, many, if not most, of these meetings tend to be conducted as one-way information delivery channels rather than as forums for productive information exchange and problem analysis and solution or strategy development. These meetings, if organized and conducted differently, provide an ideal location for the consideration of an EHR within the context of the NYS DOCS, broadly and in the specific work practices of operating units.

5. Continue current investments in the networking infrastructure within the 70 facilities and in the development of EHR system components.

Action: Continue current investments in the physical infrastructure and EHR component development, including integration with FHS1 and other systems, until a detailed analysis conducted by new health information executive, working in concert with the task force, can determine the most appropriate course of action.

Rationale: Although infrastructure updates are on-going, there is no way to assess whether current investments are moving the organization closer to the objective of an EHR. The project findings include the observation that there is no commonly agreed upon goal or vision for an EHR for NYS DOCS. Without that there is no way to systematically assess the value of those investments in terms of achieving that vision. However, the analysis did show that networking and desktop computing investments are alleviating increasing demands for system access. Providing increased access to existing agency information systems through enhanced network and desktop resources may result in increased utilization of the existing systems such as FHS1.

As indicated above, some of the components of an EHR are already either released or under development by the information technology unit at the NYS DOCS. Like the investments being made in networking infrastructure, the development of these resources represents significant potential to the agency, however, it still remains difficult to systematically assess the value of these investments in terms of achieving the benefits of an EHR. Investments in these efforts should continue until they can be assessed systematically as part of an EHR initiative.

Recommendation number five in particular must be guided by a formalized and explicit enterprise-wide focus and decision process. If recommendations one and two are not adopted then investments such as those required in this recommendation should halt until such time as the agency has the created the capability to focus executive level business expertise on creating the necessary strategic vision and in implementing that vision. Continued investments in current initiatives should be reviewed in terms of the resulting vision for the EHR. If they are not aligned or contributing to the realization that vision, then they should be stopped.

6. Build human resource capabilities for knowledge sharing and collaboration.

Action: Implement a business-focused approach to human resource capability development. Use the existing communication channels as well as new ones to

identify gaps in existing knowledge, expectations about knowledge required, and to develop priorities and strategies for closing skill gaps. Use the task force to authorize the implementation of new strategies for capability enhancements across the medical services and information technology units

Rationale: Investments in staff development and training were generally found to be ad hoc and inconsistent. Of particular relevance to this project is the inconsistent approach used to provide training for new and existing users of the FHS1 and other related medical information systems. But also of importance to the transition process is the level of comfort and experience with cross-boundary work. The site-visit data indicates a lack of horizontal knowledge sharing and process integration has led to a notable number of silos across the agency. Many facilities are facing very similar problems, yet there is limited practice of knowledge seeking and sharing as a strategy for solving problems.

7. Develop data, record, and process standards.

Action: Conduct business process and data standard development to support the transition to a data oriented electronic medical record rather than forms oriented paper record. At some point there will have to be a convergence of the Forms Committee and the Medical Data Committee and to work on data standards, transfers, and etc. There needs to be someone driving this and saying, for example, "beginning today, you are no longer a Forms Committee, you are being merged with the medical data committee". These committees must have a joint focus on medical information and on ensuring that medical information is collected and usable in a way that ensures increases in efficiencies and the continuation of quality health care for inmates.

Rationale: Data, record and process standards are the building blocks of an EHR. Development of these standards is a significant investment at all levels of the agency. Moving forward with an investment of this magnitude requires the support from the highest level of the agency and the participation of many. The process is long and hard, but the result lays the foundation for the creation of an EMR and for an enterprise architecture that will guide investments in the EHR for the long term. In fact, development of data standards and a review and consolidation of existing forms would greatly benefit the organization even without implementation of an EHR. Process simplification and elimination of unnecessary duplication is the first step toward allowing your workforce to become more efficient.

Conclusions

Each recommendation responds to a number of factors in the environment. Together they represent an emphasis on creating the capability to be successful in this transition. Recommendations one through four are primarily related to creating leadership capacity and

focus. Each represents some cost in terms of level of effort for management and coordination, meeting time for information and knowledge sharing, priority setting, and decision making and planning. In general, except for the appointment of a health information executive, the recommendations require commitment to new ways of communicating and collaborating within the agency and with key stakeholders, a continuation of current investments in networking and system resources, and an overall redirection of staff efforts toward new capabilities necessary for the development of a fully functioning EHR.

Investments are currently being made in the development of components of an EHR, however, in general these are one-off investments being made independent of an overall EHR investment and strategic change strategy. Unfortunately, we are currently unable to make a determination whether these investments are good or not. To determine if something is meeting the needs of an organization, there must be a systematic effort to determine needs and to measure investments against those needs. At this point, health information management and technology investment decisions are not being made within the context of a strategic plan for an EHR, but rather as loosely coupled components. Until an enterprisewide perspective on these efforts can be developed, it is not possible to make these determinations. “Paying” now for the development of this perspective and for the integration of it into decision making and planning at all levels is the best chance for later success.

A description of a future state of affairs as it relates to an EHR for NYS DOCS is only beginning to become clear. Much of the effort of this study was focused on capturing that description with the early expectation being that a detailed cost-benefit analysis would be possible. However, a detailed cost-benefit effort must be built on a more comprehensive description of the gap between what exists now and what is needed. In other words, only when the gap between what is and the vision for the organization is identified, will we be able to determine what resources will be necessary to make that change. This report contributes to that effort by providing the most comprehensive description to-date about the state of medical records in NYS DOCs and the nature of the challenges the agency faces in a transition away from a primarily paper-based medical record to a fully-integrated EHR.

APPENDIX A: Literature Review

Overview

In today's work environment, technology is playing a more important part in terms of how that work is done. No where is that more evident than in the health care field, where organizations are trying to better manage the information they handle about their patients through technology. A special subset of this field deals with what goes on inside of and around correctional health care organizations. This literature review focuses on the special needs and concerns given to implementing new technology within a correctional health care setting for the purposes of creating an electronic health record (EHR) system.

An EHR is defined as a medical health record system capable of providing episodic and longitudinal health information that can be updated in real time providing valuable information for quality point of care treatment and improved decision support. EHR's are attributed with streamlining information sharing across departmental boundaries and inter-organizational boundaries. An EHR also provides secure access and management of personal health information needed by clinical staff to perform their duties. An electronic health record system is not an exact set of features and capabilities; it can have all of these capabilities or any combination needed to suit a particular healthcare organization. By and large an EHR is a very dynamic and robust set of integrated medical and health information used to provide quality care and the means to continuously evaluate and improve services to meet growing healthcare needs.

This analysis of current trends in electronic health record system adoption by correctional agencies will cover the benefits of adopting an EHR, the barriers to implementing one, the risks associated with adopting this technology as well as those of not adopting it, and finally some strategies for facilitating successful implementation of an EHR.

Methodology

The literature review was conducted from March 2006 to May 2006. Literature was gathered using several methods, including the following.

- Searching academic databases for corrections specific healthcare literature relating to an EHR implementation.
- Searching online trade and academic journals for corrections specific and general literature about healthcare use of an EHR.
- Searching academic databases for medical error rates as relating to EHR implementation.

The literature review provided valuable knowledge about the known benefits and advantages of switching to an EHR system within any health care organization. These were general benefits as seen in practice but often with little contextual background. The literature was useful in terms of identifying a set of benefits to the healthcare industry in general. The bulk of the literature did not speak directly to correctional healthcare issues, but it was assumed that despite the many incongruence's between a private and correctional healthcare system, there are still many similar issues and problems that either is faced with in delivering quality healthcare services.

Overall Findings

Benefits

There are many well known benefits to implementing an EHR within any healthcare environment. One of the major reasons to consider this new technology is the ability to have shared access to integrated medical records between various medical staff. With a single primary paper record in days past, that information had to be carefully accounted for as it moved from person to person. The potential for allowing access to records electronically is an attractive feature of these systems. Access would be granted based on role within the organization, giving multiple clinicians access to pertinent patient information as needed in real time.[13] Over time the ability to view more information through the EHR will improve as will time spent looking for specific data as users become more familiar and comfortable using the system.[11] In addition to improved access, the information can be standardized or codified and tailored to their needs, allowing data to be easily transferred between organizations and across boundaries with minimal effort. When progress notes and health information are entered electronically, documentation and notes become more legible and accessible, reducing error and time spent deciphering these notes.[11] Use of an EHR has also been shown to decrease operational costs, after initial training, in conjunction with these benefits. EHR use results in better informed clinicians who in turn are able to make effective and efficient decisions which raises the quality of care being provided to their patients.[11]

Medical Records Institute EHR Survey

This survey was administered by the Medical Records Institute in 2005. The results are not representative of the majority, rather they serve as an indicator of relative use by those respondents with an EHR system. The results in this survey point towards common practices within the field by healthcare professionals, but are not scientific enough to extrapolate to the whole health care community. It is, however, interesting and valuable to see how others are using EHR systems in their organizations.

The primary reasons why companies decided to implement an EHR are: to improve clinical process efficiency, improve quality of care, reduce medical errors hence improving safety, increase information sharing across boundaries, and to improve data capture. Another characteristic clinicians value (for those who already have this and those that want this) is the ability to communicate with one another through the system (i.e. e-mail, instant message, etc.). The major barriers identified by the respondents are: difficulty of migrating data, adequate support for the medical staff, and difficulty of use.

There are some more interesting results from the survey, such as data entry methods. The vast majority of respondents used either free text entry, as in keyboard and mouse, PDA tablet or dictation; or some kind of structured entry through the use of templates, codes and a touch screen. Other points of entry that rated popular among users, was input from other department systems and document scanning. Over half of new EHR systems run on client-server platforms, while a quarter still run on mainframes.

A large component of these EHR systems is the ability to enter information and have it be checked by the system against a number of rules to guard against harming the patients. A computer physician order entry system, or POE, provides complete and accurate information, automatic dose calculations, and clinical decision support at point of care, including drug-drug interaction, allergy checking, checking for duplicate or related orders, weight based dosing, and drug route restrictions.[2,10] The drug ordering system is known as an electronic medication administrative record, or eMAR. POE combined with eMAR have been shown to improve patient safety and timeliness of care by improving ordering, transcription, pharmacy verification, dispensing and administration processes as well as reducing errors and preventing further ADE's.[6,10] A POE helps

reduce transcription errors because orders are complete, legible and unmistakable. An eMAR helps doctors with doses and frequencies as well as checking for other problems that might arise with drug ordering.

Telemedicine is a very diverse and robust technology with varying levels of complexity and intricacies, therefore deciding which equipment and services are necessary is a judgment that has to be made with organizational needs in mind. One aspect that benefits the entire agency is that using telemedicine ensures standard, uniform heath care across the board, no matter the size of the facility.[12] Quality of care is positively affected because access to more specialized and experienced physician's is possible. In addition to improved access, the time between referral and consultation is drastically shortened with proper use of this technology.[15,17] Satisfaction by both the inmate and physician has increased in terms of the perceived level and quality of care with the use of telemedicine, as time to treatment and travel needed is less.[5,15]

The level of care that patient's actually receive is bolstered when their perceived level of care meets or exceeds the actual level of quality. Knowing what telemedicine can provide for the patient is certainly important, but being aware of the benefit to the healthcare organization is just as important. There are many advantages to utilizing this technology to address unique concerns within any agency. Telemedicine can work if the services provided within facilities are not comprehensive enough to meet patient needs and the cost for onsite specialist visits is too prohibitive, specialists are not available when needed, the volume of patient needs do not warrant a contracted specialist, transportation costs are high due to staffing requirements and the distance traveled, when concern for safety of officers and community could be improved with less inmate movement, or when the quality of care could be improved due to shorter periods of time between diagnoses and treatment.[17]

To give an idea of the kinds of savings reported through use of telemedicine – figures from a U.S. Department of Justice and National Institute of Justice study found that after only 1,500 consultations the cost of equipment was recouped.[15] Cost of correctional health care services provided through telemedicine were 60% more cost effective over face to face consultation, which includes travel.[5,17] Those savings mostly came from physicians no longer having to visit facilities, modest savings were seen in the cost to transport inmates outside the facilities.[17]

The Department of Correctional Services in Kentucky has reported a 40% savings in budget spending as a result of implementing telemedicine.[14] Part of their EMR system utilizes wireless technology in the exam room. Physician's carry tablet pc's for note taking and those are automatically synchronized wirelessly through their web based system.[14] The University of Texas Medical Board in conjunction with the Texas Department of Correctional Services, uses portable units complete with exam tools for their telemedicine consultations.[12]

Barriers

Along with these benefits there are some costs or concerns to be aware of before significant progress is made towards an EHR. The initial cost to implementing such a system is obviously high with uncertain payoffs, but with proper care in managing these risks positive results and returns can be produced.[11] In the beginning there is a high initial time commitment for clinicians who are learning to use the new system. Difficulties arise due to lack of technological know how, negative attitudes towards technology and the changes affected by altering the workflow.[11]

Risks

There are myriad risks involved with the implementation of such a dynamic and complex system as an EHR. Developing a strategy to help mitigate the negative effects associated with such extensive change is important. Some of the risks mentioned here may appear to be quite specific, but reflect the overall organizational structure and behaviors inherent to a healthcare environment. The solutions provided here are merely suggestions as to how best handle situations in a specific setting, which deals with it's own unique set of problems and constraints. Looking at how other agencies have resolved issues in there unique settings can provide a good indication of whether or not a specific strategy will work.

Medical errors result in a large number, estimated to be upwards of 1 million, of injuries per year. A considerable amount (20%) of these mishaps is attributed to adverse drug events, or ADE's.[6] These types of errors are costly and cause substantial extra work. The cost of these ADE's has been placed anywhere between two to five thousand dollars per event.[2,6] These are anything from diagnostic, treatment or preventative errors when ordering, transcribing, dispensing or administering drugs to patients.[7] This problem is a result of the decentralized and fragmented nature of healthcare systems distributed across services and departments in addition to constant movement of the patient.[7] It is through faulty systems, processes, and conditions that lead to or fail to prevent providers from making such errors.

Of utmost concern throughout this transition period is the overall physical integrity and security of the system. Data quality standards are a key element to a successful implementation plan. These standards include things like accessibility, accuracy, comprehensibility, consistency, currency, a clearly defined, level of granularity and relevancy. Access needs to be controlled so that patients are not able to tamper with or disrupt the system.[16] The majority of security breaches occur within an organization, usually as a result of not knowing how to use the system properly. It is not usually a result of outright malice (of course, this may be where private industry and correctional healthcare differ as far as internal or inmate related security breeches are concerned) . This can be controlled by allowing for a series of authorization steps before access is granted.[16]

Correcting the electronic systems is a step in the right direction, but should not be taken for granted. Relying on a system to be a catch all is not recommended if safety and accuracy are top concerns. Although they have the potential to reduce a lot of these errors, they can create a whole new set of problems if not designed or used properly.[8] Information entered into the system needs to be accurate, complete and current in order for the system to output accurate, reliable decision support. Just as before physician order entry systems were in place, redundant processes is one defense against unnecessary medical errors. In this instance, redundancies should be built in to check the information that has been entered so mistakes made at the computer terminal are not carried through system. A well designed POE system will be able to properly balance technology with healthcare providers behavior's and culture. Increasing efficiency with a new system is a good objective, but the overall goal should be to increase measures to ensure patient safety.

Strategies

The majority of the risks inherent to such an extensive initiative is user buy-in and support throughout the agency. This theme can be seen throughout the list of risks and solutions to follow. How the day to day user responds to a new system is essential to understanding how to prepare for those changes. Implementation of a new system is a stressful time and minimizing undue pressures can help alleviate further problems.[11] One way to support successful implementation is through the

adaptation of agency policy to reflect those changes. Developing standards that promote cross-agency interoperability should be an important part of the process.[13] Changing policy also allows agencies to reflect on how they want to make the most of the system. Policies put in place that support and encourage clinicians to adjust to the new system have yielded positive results. These changes should encourage clinicians to adopt the new system over the paper-based way of doing things. Compelling users to acclimate themselves quickly, without being able to revert to past practices or systems, can ensure progress is made towards full acceptance and implementation, providing proper training and support along the way. Removing redundancy from the workflow (i.e. the paper way and the electronic way) can make it easier to cope with learning the new system and make it less tempting to fall back on the old way of doing things.[11] Having a clear strategy for how the switch is going to be made is important for the ultimate success of the system. It is imperative to consider when primacy (that is when the electronic health record will become the primary, legal document for conducting business) will be transferred to the new system and when and how old practices will be put to rest. Deciding when and how to go about doing this depends in part on standing business rules and statutory regulations.[16] The purposes of new policy is not necessarily to command change, rather it is to put everyone's energy behind the new system with the ultimate goal of improving quality of service along with the gains associated with using a solitary and unified system throughout the entire agency.[11]

Productivity and responsibility are both crucial elements to the success of these types of systems. The considerable amount of time and money it takes to become familiar with a new system is due in large part to redesigned workflow and responsibilities. These types of systems establish new or changed responsibility and interaction with the health record. This change needs to be managed at all levels, including clinical, administrative, cultural, and organizational.[16] Change is often easier for larger organizations because of their larger support staff.[11] Being able to commit adequate training and continued support throughout implementation is a good way to ease transition and encourage use of the system. The change in how clinicians manage patient information should be considered in some regard a cost, but one that can be addressed with proper training, support and time.[16] The integrity of clinical processes and continuity of care can be jeopardized by maladjustment between the two disparate systems.[16] Being able to support users at whatever cost is really what's needed throughout this process. Usability needs to be addressed especially with things like progress notes. Being able to enter data real time, with no unnecessary redundancies, might entice greater use of the system.[11] The system can be designed to accommodate users comfort levels with new technology, specifically at the point when a physician interacts with the system. One of the more intriguing methods for entering data is through the use of template forms, which can code the information for greater transparency and include prompts for better decision support.[11] Whatever method is chosen, the key to success is making sure that the workflow is enhanced and fully supported throughout the learning period. Care needs to be taken to ensure that the transition does not negatively affect the quality of care provided at the point of service.[16]

Above all, the system belongs to those who will use it every day to carry out the processes of their job. Granting access to those that need it and a grassroots network can help foster acceptance from the user. Ownership of the system falls upon the clinical staff and they need to accept that for a successful implementation it's going to require learning time to become adept at using the system. Nevertheless, strong support and willingness to help users through their problems lies upon the IT department. The two units need to understand their role in the implementation process and appreciate the complex nature of this interdependent relationship so that the entire organization can strive for a successful outcome. A self-awareness that each division plays a crucial part in this process is important in terms of accountability and action taken towards making the initiative work.

Use this knowledge then to create a system that works well within the organization and its business processes.[18]

There is a lot of interest in telemedicine as it relates to the use of an EHR system. One reason there is strong support for use of this technology is what it can over time in terms of cost savings and quality of care. An important decision that needs to be made before telemedicine is implemented or expanded is projecting the value gained from using it. Typically telemedicine equipment will include pc workstations, videoconferencing with cameras, telecommunication equipment and possibly the use of medical peripheral devices such as micro-cameras or electronic stethoscopes[8].[5] Telemedicine has the capability to handle such medical needs as x-rays, CT scans, MRI, other digital imaging as well as dermatologist consultations.[4]

Forming a committee or decision support group has proven beneficial with reviewing processes, making sure that all levels of involvement and input are represented.[17] Things to consider are the target population, their demographics and needs; facility healthcare statistics such as caseload, consultations and transfers; and consultation statistics such as the type, frequency, time spent, cost, location and availability, along with the qualification of the specialist.[17] Knowing where change is needed is important; Is more specialist help needed or do medical services themselves need to be improved? Review alternative solutions weighing the cost and benefit of each one, always keeping in mind telemedicine should supplement in house care, not replace it all together.[1,17]

An important factor besides actual cost is the time and acceptance of new technology by clinical staff. Training and technical support need to be adequate enough to support users when first learning how to use the new system. Reports have shown that close contact and support between technical and clinical staff leads to greater rates of acceptance and overall success. Building strong relationships between the two groups enabled proper support for over 1,000 telemedicine visits per week as reported by the University of Texas Medical Board.[3] It is recommended that the baseline system meet the most frequently used or critical types of requirements.[17]

One thing to be aware of with increased use of telemedicine is the potential for less personal contact with the patient. This may just be a function of how well physicians adjust to incorporating new equipment into their workflow.[12] Data entry may be slow in terms of typing or scanning in handwritten notes, but voice recognition software has shown considerable success in handling this task. There is also the option of having touch screens or mobile wireless technology to facilitate easier and faster data transfer from the exam room to the system at large.[3]

Conclusion

Adoption and implementation of an EHR offers great benefit to any healthcare organization trying to trim down and provide better medical services. An EHR system while offering greater access to information and sharing possibilities across medical services can also aid in streamlining healthcare delivery. In this day and age, it is not given than everyone is comfortable or ready for such a transition, but with the proper training and support there should be no reason an EHR cannot be successfully implemented.

[8] Videoconferencing was the primary medium through which telemedicine was conducted. Fax machines seemed to work just as well as document cameras for relaying images. E-stethoscopes were pricey and not often used or accepted. [12]

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APPENDIX B: Project Methodology and Interview Protocol

The Project

The project was initiated in the summer of 2005 when Commissioner Glenn Goord, currently serving as Public Service Professor at UAlbany's Rockefeller College of Public Affairs and Policy, agreed to sponsor a graduate student project by his agency. The project was carried out in three overlapping phases. First, in the summer and early fall of 2005 the professional staff of CTG conducted a preliminary research of the EHR landscape in the United States and the costs and benefits associated with its implementation. In the second phase, a graduate class under the guidance of Dr. Theresa Pardo, the Deputy Director of CTG, identified the primary stakeholders within the DOCS community, conducted business process analyses of their day-to-day workflows, and carried out group interviews to collect stakeholders' primary hopes and fears as related to EHR implementation.

In the third phase of the project, CTG staff extended the work of the students to a more detailed cost benefit analysis that addressed policy, management, organization and technology issues related to a possible adoption of an EHR, as well as providing a set of recommendations for next steps. A three-pronged approach consisting of field data collection, literature review and current practices review has been used to capture the information necessary for this report. Data for the third stage of the project were collected over a period of four months, beginning in March 2006. The project was completed in July 2006.

Methodology

The data for this study was collected through several methods, namely interviews, literature review and current practice review. Individual and group interviews were conducted with health care professionals and medical records staff employed by DOCS and county correctional facilities. The interviewees were selected to provide the investigators with a representative sample of various health care and administrative roles within New York's correctional community. These interviews were conducted at the facilities and their duration varied depending on the number of people being interviewed and their availability.

Additional background and current practices information was collected through an information gathering session with state agencies interested in health record exchange with DOCS and through teleconferences with correctional departments of Florida, Kentucky, Washington, Colorado, Nebraska, California and British Columbia, Canada, all of which are in various stages of EHR adoption. Literature review and web search provided general knowledge of EHR systems in civilian settings and the costs and benefits associated with its implementation. Overall, the CTG team interviewed 89 individuals.

In order to gain an understanding of the correctional landscape, DOCS selected three state and three county correctional facilities representative of the correctional community in New York State. The three state correctional facilities were a female high-security facility at Bedford, a male medium-security facility at Ulster, and a male high-security facility at Coxsackie. In total, the CTG team interviewed 47 DOCS facility employees, 19 of which were administrative or records staff and 28 were health care professionals. We also interviewed 2 Regional Medical

Directors, 3 staff members from the Division of Health Services, and 3 staff members from the Management Information Services regarding the current technological capabilities of various facilities and future infrastructure updates.

The three county facilities selected were Onondaga county, Orange county and Dutchess county. The CTG team interviewed 11 people, 7 of which were administrative or records staff and 4 were health care professionals. Because Dutchess and Orange counties contract with private health companies for the health care of their inmates, 2 people of the 11 were employees of Prison Health Services and 1 was an employee of Correctional Medical Services. In addition to the three counties selected by DOCS, we also visited Westchester County to view their existing EHR system.

Given the prominence of New York City within the correctional community of New York (approximately 80% of the incarcerated population originates from New York City), the CTG team visited the NYC Department of Health and Mental Hygiene who is responsible for the medical care of inmates in NYC jails as well as the NYC Department of Corrections. We interviewed 3 individuals at the NYC DHMH and 1 member of NYC DOC. The purpose of this visit was not only to collect data regarding their information exchange with NYS DOCS, but also to gain information about an EHR system soon to be implemented in NYC correctional facilities.

In addition to our interviews with correctional personnel, we organized an information-gathering session with representatives from various New York state agencies identified by the NYS DOCS as having an interest in health records exchange with DOCS. We interviewed 9 people from the NYS Office of Mental Health, NYS Department of Health, NYS Department of Parole and NYS Office of Children and Family Services. We also conducted a site visit to the Veterans' Health Administration whose EHR system is recognized to be one of the most comprehensive and reliable electronic systems in United States. Other input was gained via teleconferences and correspondence with correctional departments around the country who have implemented an EHR system or are in the process of doing so.

Finally, background information on EHR systems was gained through an extensive literature and web search conducted throughout the duration of this project. The aim of this review was to gain an overall picture of the EHR landscape in United States and to gather general categories of benefits, costs and barriers associated with an EHR adoption.

Interview Questions: County Correctional Facilities

- If NYS developed an electronic health record and asked that you send all health information electronically, what would have to happen to do this?
- What are the biggest barriers?
- How many inmates do you have?
- How many medical staff?

Interview Protocol: Management Information Services

Current Infrastructure Capabilities:

- What does your current infrastructure look like now?

- How many facilities have been wired?
- What is your level of adequate infrastructure in each facility?
- What types of infrastructure plans are in the works for what facilities?
- What facilities have a more complete infrastructure than others?
- What applications are being enhanced? Developed?
- In your view, what is the range across the facilities as far as ability to participate in an EHR?

Future Plans for IT?

- What are you planning to do in terms of your infrastructure in the next two years? Are you planning on hiring additional personnel to handle infrastructure updates and staff training?
- By your estimate, how many facilities will be fully updated to be able to handle an E#HR system?

Guiding Principles and Business Rules:

- Are there formal or informal business rules that you follow?
- How do you make decisions, ranging from something simple such as change to a current application to purchasing a new system all together?
- How I is collaboration between different branches of DOCS coordinated?
- Are there well established communication channels between various departments of DOCS? Are they used?
- How do you work with Health Services.

Interview Protocol: State Correctional Facilities

Ideal Characteristics:

- What are the characteristics of an ideal electronic health record environment at your facility?
- Of these characteristics which are the most important and why?

Strategies, Barriers, Resources and Risks for Each Characteristic

- What strategies should be employed to realize the top ranked ideal characteristic?
- What are the barriers to achieving these ideal characteristics?
- What resources would be required to achieve these ideal characteristics?
- What are the risks involved in realizing these ideal characteristics?

Priority and Do-ability

- Of the things we have talked so far, do you think moving to an EHR is a priority and is it doable?
- Why are some things more doable than others?
- Of the 11 business processes, which would be most improved in terms of efficiency and effectiveness if the high priority, doable actions were performed and how would they be improved?

Next step

- In your view, what should be the next step for DOCS?

Interview Protocol: Relevant State Agencies

EMR/EHR

- What are your thoughts on the differentiation of the EMR and EHR?

Current Environment

- Do you currently share health information with NYS DOCS?
- If you do, what do you share and how?

Ideal Environment

- Would you like to share health information with NYS DOCS?
- If so, what does the ideal environment look like?

Strategies, Barriers, Risks

- What strategies should be employed to realize this?
- What are the barriers to achieving this?
- What resources would be required to achieve these ideal characteristics?
- What are the risks involved in realizing these ideal characteristics?
- What else do we need to know? Learn? Pay attention to?

APPENDIX C: Industry Definitions Of EMR and EHR

Information Sources	
A	American Health Information Management Association (AHIMA)
B	Department of Health and Human Services and Institute of Medicine (DHHS and IOM)
C	Healthcare Information and Management Systems Society (HIMSS)
D	Medical Records Institute (MRI)
E	American Telemedicine Association (ATA)
F	Telemedicine Research Center
G	International organization for Standardization (ISO) Technical Committee Health Informatics

Term	What	How
Electronic Medical Record	A provider-based electronic medical record that includes all health documentation for one person covering all services provided within an enterprise. (D) The EMR can be used as a natural stepping stone toward an EHR. (D) Could be considered as a special case of the EHR, restricted in scope to the medical domain or at least very much medically focused (G)	An electronic system to automate paper-based medical records. (A)
Electronic Health Record	A secure, real-time, point-of-care, patient-centric information resource for clinicians. The EHR aids clinician's decision-making by providing access to patient health record information where and when they need it and by incorporating evidence-based decision support. (C) The EHR automates and streamlines the clinician's workflow, closing loops in communication and response that result in delays or gaps in care. The EHR also supports the collection of data for uses other than direct clinical care, such as billing, quality management, outcomes reporting, resource planning, and public health disease surveillance and reporting. (A)	Depicts the technical system components that capture and integrate data and support caregiver decision making because the EHR is a set of functions that provide value integrating clinical, financial, and administrative data contributes to improvements in quality, cost, and access to healthcare. (A) Identifies eight care delivery functions that are essential for such records to promote greater safety, quality and efficiency. They are (1) health information and data, (2) result management, (3) order management, (4) decision support, (5) electronic communication and connectivity, (6) patient support, (7) administrative processes and reporting, (8) reporting and population health. (B)

Term	What	How
Tele-medicine	The use of medical information exchanged from one site to another via electronic communications to improve patients' health status. (E) Specialist referral services typically involves of a specialist assisting a general practitioner in rendering a diagnosis, Patient consultations such as using audio, video and medical data between a patient and a primary care or specialty physician for use in rendering a diagnosis and treatment plan, Remote patient monitoring uses devices to remotely collect and send data to a monitoring station for interpretation, Medical education provides continuing medical education credits for health professionals, Consumer medical and health information includes the use of the Internet for consumers to obtain specialized health information and on-line discussion groups to provide peer-to-peer support. (E)	Videoconferencing, transmission of still images, e-health including patient portals, remote monitoring of vital signs, continuing medical education and nursing call centers. (E)
Tele-health	Is the delivery of health care from a distance. Modern technology has made it possible for patients to receive health care in many different ways. Closely associated with telemedicine is the term "telehealth," which is often used to encompass a broader definition of remote healthcare that does not always involve clinical services. (F)	Technologies such as telephones, email, computers, interactive video, digital imaging, and health care monitoring devices, make it possible for clinicians to monitor, diagnose and treat patients without having to physically be with the patient. (F)

APPENDIX D: Current Practice Review

State-Specific Information

State of California Department of Corrections and Rehabilitation

http://www.cdcr.ca.gov

- 168,000 inmates
- 90 facilities
- Have an EHR suite in 1 facility, with no further implementation plans, and a pharmacy system in 1 facility, which is being modified for the new EHR.
- Working towards a new Offender Management System which will include an EHR. Implementation planned to begin next year.
- Plan to release an RFP to vendors.

They are currently planning to implement their EHR within the next few years. They are adding a whole new system, called Strategic Offender Management System (SOMS), which will actually encompass the EHR component. SOMS will be the complete electronic CDCR management system. They have completed a business process analysis of their operations, developed high level requirements and received responses to a Request for Information.

They have submitted an analysis to the Federal Court of California, which addresses the requirements needed to accelerate EHR implementation. Their analysis includes defining the migration pathway, implementation strategy, a view of the work breakdown structure, preliminary sequencing and budgeting. They are completing a first pass of a System Essential Model which covers all of their processes. They have done data flow diagrams, data dictionary definitions, and informal use cases for all of their processes. In the second pass they will create detailed use cases, test cases, develop the non-functional requirements and define the structure of the business rules. A third pass will consult a larger panel of business experts to define the business rules and reports and validate previous work. They anticipate releasing an RFP by 2007 and begin contract bidding that summer.

State of Florida Department of Corrections

http://www.dc.state.fl.us

- 85,000 inmates
- 128 facilities
- Have an EHR called Computer Assisted Reception Process (CARP) at their 5 State Reception Sites.
- Planning for a state wide EHR implementation will hopefully begin next year.
- CARP was designed and built in-house by MIS.

Florida's EMR initiative began back in 1993, when the DOC proposed to automate the reception process at their five state reception facilities. Computer Assisted Reception Process, or CARP, was installed later that year and now they hope to expand its implementation across the state. CARP includes features like diagnosis, medications, provider information and the problem list.

They are reviewing other states current practices and use of an EMR with the goal of expanding their present reception level system to a full blown EMR in every facility. At the state prison facilities they are running a complete offender management system called Offender Based Information System, or OBIS, which is not interactive and does not interface with CARP. There are no plans, as of yet, to integrate the two systems.

State of Kentucky Department of Corrections

http://www.corrections.ky.gov

- 20,000 Inmates
- 13 Facilities
- EHR is up and running state wide, using web-based wireless technology, as of Spring 2006.
- Went through a vendor for their EHR.

The project first began in 2004 when the DOC began considering what an EHR would do for their healthcare services. They decided to focus on specific types of care rather than an all inclusive approach, because of the high volume and cost that would entail. Their system currently captures critical data such as problem lists, medication lists and an allergy list and has a health care management component, decision support and reporting capabilities, order management system and offers the means to communicate electronically between clinicians. Kentucky uses wireless technology with their web-based EHR system. Since they went with a web based wireless system there was not too much infrastructure that had to be brought up to speed. This system does require a high level of encryption for their internet as well as all their equipment within the facilities. The DOC receives added protection from their state Office for Technology.

State of Nebraska Department of Correctional Services

http://www.corrections.state.ne.us

- 4,000 Inmates
- 11 Facilities
- Currently implementing their EHR system state wide.
- Went through a vendor for their EHR.

Nebraska is currently in the middle of implementing an EHR system which includes a pharmacy package along with medical, dental, optometry, mental health and substance abuse records. The EHR is equipped with features that will not be used right away but once the equipment and capability is there it can be easily integrated (e.g. the ability to accept and transfer electronic EKG, x-ray, digital images). It took them two RFP processes before the Medical Department realized they could not get everything they wanted with their budgetary limitations. They had to pare back their demands and really focus on what features were absolutely necessary to operate and work with. It was a challenge for them to agree on what they really needed as opposed to what they wanted to have. They made some allowances by deciding to make their EHR compatible for future growth.

State of Washington Department of Corrections

http://www.doc.wa.gov

- 17,000 Inmates
- 15 Facilities
- No official implementation date planned, but they have distributed EHR specifications to all their facilities for individual action before legislation is passed.
- Have an RFP ready to release to vendors.

They do not have any official implementation as of yet. Currently, the EHR proposal has not been passed by legislation but the DOC has authorized implementation specific protocol should facilities decide to take it upon themselves to prepare for statewide implementation upon legislative approval.

DOC has issued a set of criteria for those individual facilities interested in setting up an EHR system at their location. There is currently only one facility that has taken it upon themselves to follow and implement the EHR criteria put out by the central DOC office. As far as functionality is concerned they are focusing on the necessary operational functions.

British Columbia, Canada Corrections Branch

http://www.pssg.gov.bc.ca/corrections

- 2,700 Inmates
- 10 Facilities
- Have a Primary Care and Assessment EHR in half of their facilities and will be completely installed in all facilities by Fall 2006.
- Went through a vendor for their EHR. System is Government Owned Software which means they own the rights to the software.[9]

Prior to starting this EHR initiative they revamped some of their service delivery models. Fixing these allowed them to pursue an EHR starting in 2003. They decided to go with Government Owned Software, GOS, that was open source. It was built by a vendor contracted through the federal government. The IT rights are owned by the government, modifications are done through the vendor and the province has rights to modify the system as needed. Their EHR is a primary care, assessment and encounter based HIS. It does not have acute care capability such as labs integration yet. They have built those capabilities into the system, but are not yet operational. There are pharmacy and mental health components of this EHR, which are managed by the Government and Mental Health respectively. These two components have been running for some time and will continue to feed information into the new EHR system.

[9] Similar to this arrangement is the National Consortium for Offender Management Systems, or NCOMS, which includes eight states that "buy-in" to the system and are obligated to freely distribute any software code that their state develops to the other participating states. The original software was developed through a vendor and the rights handed over to the consortium upon implementation. The states maintain their software but can choose to go through the vendor for updates or modifications. The Idaho Department of Correction is the NCOMS Chair (http://corrections.state.id.us).

Common Themes

Shared, Real Time Access

- *Florida DOC.* They assembled a design team in 1993 to figure out how to proceed with their EMR goals. Later that year all five facilities were running this new system called CARP. The EMR running within their county jail system is still in use which sends a transfer summary to the state level reception centers when inmates are moved up. The fact that state facilities receive this summary transfer information upon reception into their system is fortunate since they have no authority over the county facilities. The biggest barrier they faced so far is the disconnect between the two state level systems. The OBIS system is view only, so records need to be uploaded from CARP to gain access at the state facilities, but are not able to be updated. With CARP installed at all their facilities, there would be a base level of medical information provided and shared for all the facilities.

- *Washington DOC.* Once the RFP is approved they feel their specifications will ensure compatibility and ease of integration across the state. The RFP was put together with the help of a consultant and requires that equipment should be bought from a specific vendor, as well as specified protocols and applications be followed.

- *British Columbia Corrections Branch.* The EHR gives them instant access within and across their facilities. The Government infrastructure affords them easy access and record sharing since the network has already been taken care of.

Standardization

- *Florida DO.* Before CARP was installed there was no consistency between sites, each had their own forms, standards and practices. Another barrier that arose during implementation of CARP was the insistence of system customization, over continuity and standardization. They had to find a balance between what they really needed and what they wanted. Despite some initial troubles they had with CARP it has proven to be quite beneficial. It has standardized the intake process across the board, making it more efficient, consistent as well as producing records that are legible, clear and complete. The system has a click through screen with soft-prompts (some standard and some custom) and has eliminated the need to transcribe or copy records by hand.

- *Kentucky DOC.* Their EHR interface is click through template style screen, which provides easy, quick and standardized data entry into the system, as opposed to open entry boxes which have to be typed in.

- *British Columbia Corrections Branch.* By going with government owned open source software they have found that changes to the record format are a lot easier and with no licenses to consider they are free to customize and standardize the record process as they choose.

Organizational Structure and Lessons Learned

- *California CDCR.* They are not planning on expanding their existing components throughout the state primarily because business experts were not consulted strongly and soon enough to produce much benefit in terms of increased productivity when healthcare providers were using the application. They learned that they did not spend enough time preparing, evaluating and designing prior to implementation and now they are taking a much more rigorous approach towards their new EHR.

- *Florida DOC.* They faced two major concerns with their OBIS and CARP systems. The first is that the OBIS system resides out of state, so control of the system is outside of their scope thus creating a stress point between the users and the system. There were also concerns regarding the stability of computer memory with loss of data and e-signatures, but those fears have not been realized.

- *Kentucky DOC.* The EHR initiative in Kentucky was initially supported by the State Commissioner who brought together DOC Medical Services, the University of Kentucky and a private health care firm in order to better manage inmate health care services. They were able to identify the key components necessary for their EHR because they formed committee's that consisted of physicians, nurses, clinical staff, IT staff, and managers that were involved in planning and developing their strategy. They attributed their success in large part because of user involvement and training them in the system.

Currently, they still use some paper but are in the process of phasing it out. They are relying less on paper and have encountered some frustration from users with that transition. There is no formally designated liaison to communicate feedback from users to upper management and support is typically provided at the ground level. Trying to get a better handle on what the users are saying about the system has been a major area of improvement for them.

- *Nebraska DOCS.* The Medical Director was the sponsor for this EHR initiative. They have installed a Project Manager in Health Services with an IT background. This position was a new hire and their responsibility is to manage the day to day progress and issues of the project team and EHR. A project team was formed from within various departments in DOCS, namely Purchasing, IT and the many Medical disciplines within their Health Services. Corrections does not have a permanent seat on this team (because they will not be using this application) but they are called in as a consultant when needed. They wanted primary users to contribute and be involved in the planning and design consideration.

  The biggest barrier from the vendor's point of view was how to properly scale up a system intended for individual medical clinics to a statewide application with many facilities replete with governance requirements and issues. Within the facilities themselves, medical staff is challenged by using computers to enter information were previously they recorded information on paper charts. They did not create any new policies but worked with the ones they had. The security policies were not a problem because they were pretty clear. For example, they were not allowed to put networked computers in exam rooms because of inmates but they were allowed to bring in tablet

pc's that could later be docked in a more secure area. They found that tablet pc's offered better functionality than PDA's

- *Washington.* They anticipate common barriers to implementation, such as staff resistance to learning a new system, lack of training, lack of sufficient placement and accessibility to equipment, the need for coordination and communication between the medical and non-medical units, and the willingness from the non-medical side to give this initiative the priority that it needs, when it is needed

- *British Columbia.* The IT Department and the Corrections have been driving the EHR initiative. The Corrections Branch has partnered with the provincial government for infrastructure maintenance, but does not receive directives from above concerning this project. There is a new Project Manager, with expertise in public health systems, that is positioned in Health Services. There are newly formed steering committees that consist of Correctional Health Services people and Correctional Program people. These working committees are comprised of Health Services, IT, and Corrections Program staff. The working committees are focused on the use of the health professionals, so consideration to security issues was done when health information crossed into their realm, such as transferring inmates along with their medical record or distribution of medication throughout the jails. This was done because of the fear that security personnel would have access to health information that was not pertinent to their job. The privacy issue was a concern among health care staff, but it have proven more of a perception than a system fact.

They have already gotten suggestions and feed back from users regarding the system and are waiting until implementation is complete throughout the province before they are given further consideration. Workflow no longer has to be juggled inefficiently or ineffectively by a person. Prompts and guidance are built into the system. They are seeing the data quality improve, which can now be monitored through the system. The medication management and distribution has also shown benefits.

They are noticing some user resistance transitioning from paper up to an EHR, but it is nothing they have not seen or handled before with their offender management system. There was also confidence issues in whether the system would be as reliable as the paper record in terms of long term storage. Both of these concerns are diminishing amongst users as they become more familiar with the system. This is attributed to the training and support they provided throughout the implementation process. They are making some allowances for slower learning rates, but will begin setting deadlines if those users become a hindrance. Throughout the learning period they will be monitoring user progress and acceptance levels to re-assess their training and acceptance policies.

APPENDIX E: Preliminary Analysis of Business Processes

New York State Electronic Health Record
Preliminary Analysis

Prepared by
Rockefeller College
PAD 650 Class

In Conjunction With The
Center for Technology in Government
University at Albany, SUNY

For the
Office of New York State Department of Correctional Services

Center for Technology in Government
University of Albany / SUNY

December 2005

NEW YORK STATE ELECTRONIC HEALTH RECORD PRELIMINARY ANALYSIS

Prepared by the
Rockefeller College PAD 650 Class
In Conjunction With The
Center for Technology in Government
University at Albany

For the
Office of New York State Department of Correctional Services

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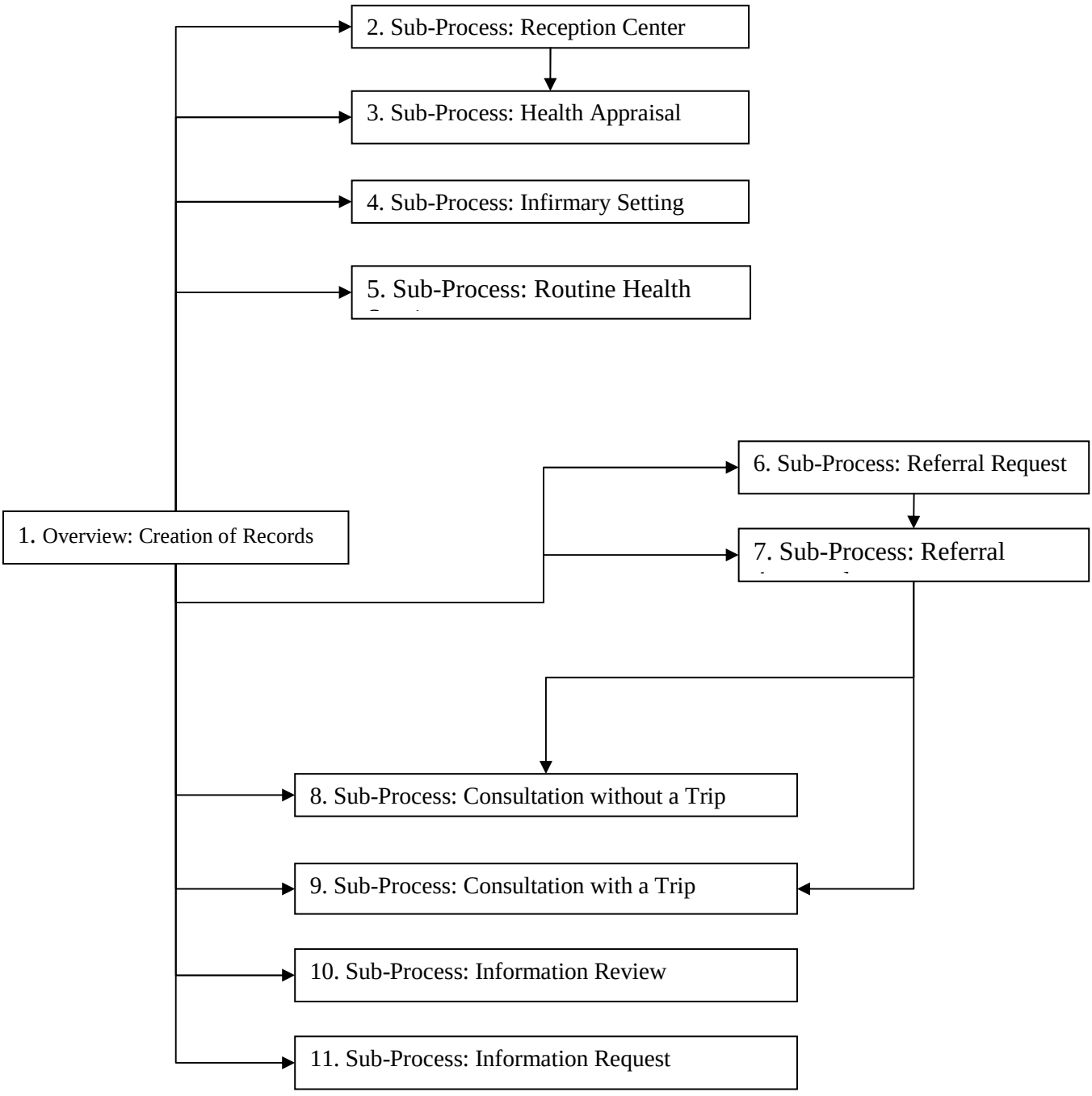
Paula Butler		Benjamin French
John Culkin		Xiaoai Ren
Frank C. DeVane		
Robert McArdle		

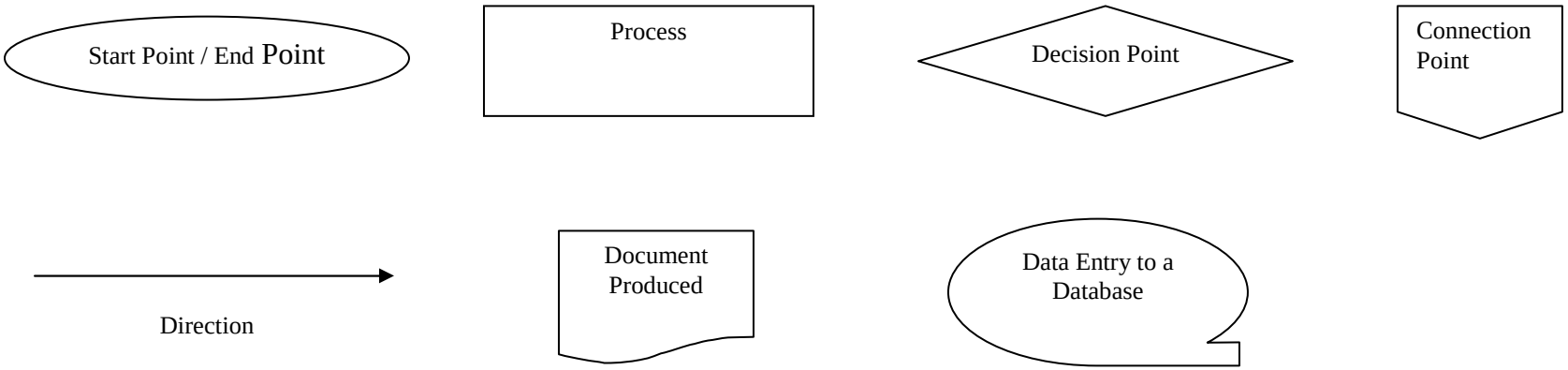
December 2005

Micro-View of the Real World -- Business Process Modeling

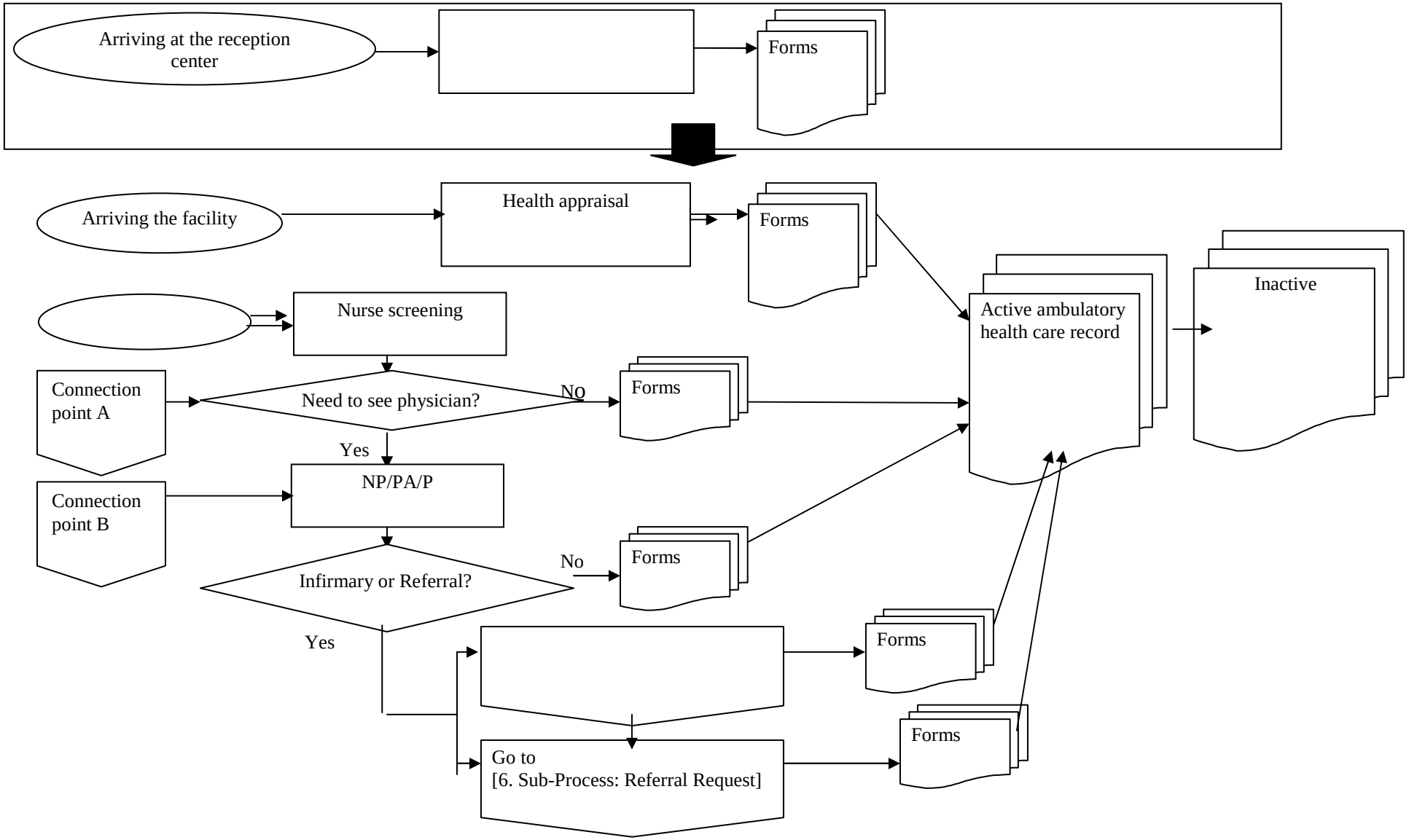
Focusing on the Information Life Cycle of a Health Record



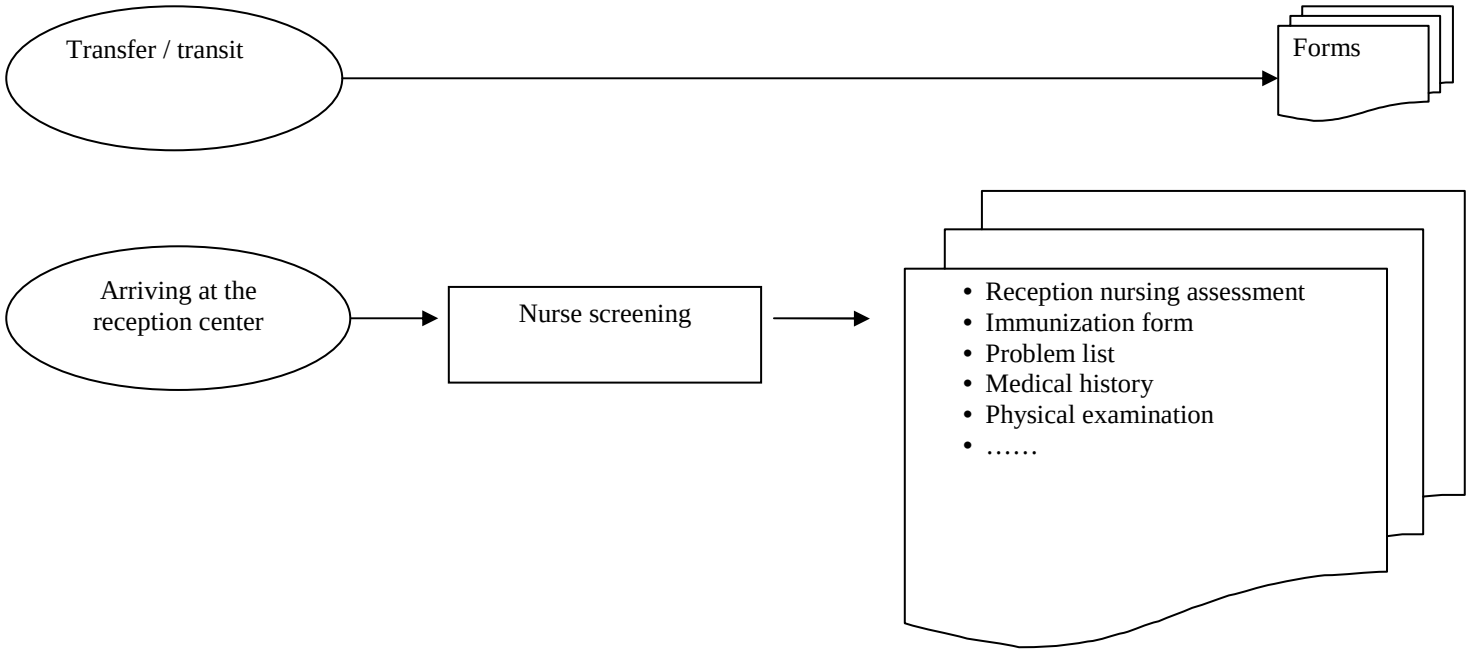
Legend


Start Point / End Point
Process
Decision Point
Connection Point
Direction
Document Produced
Data Entry to a Database

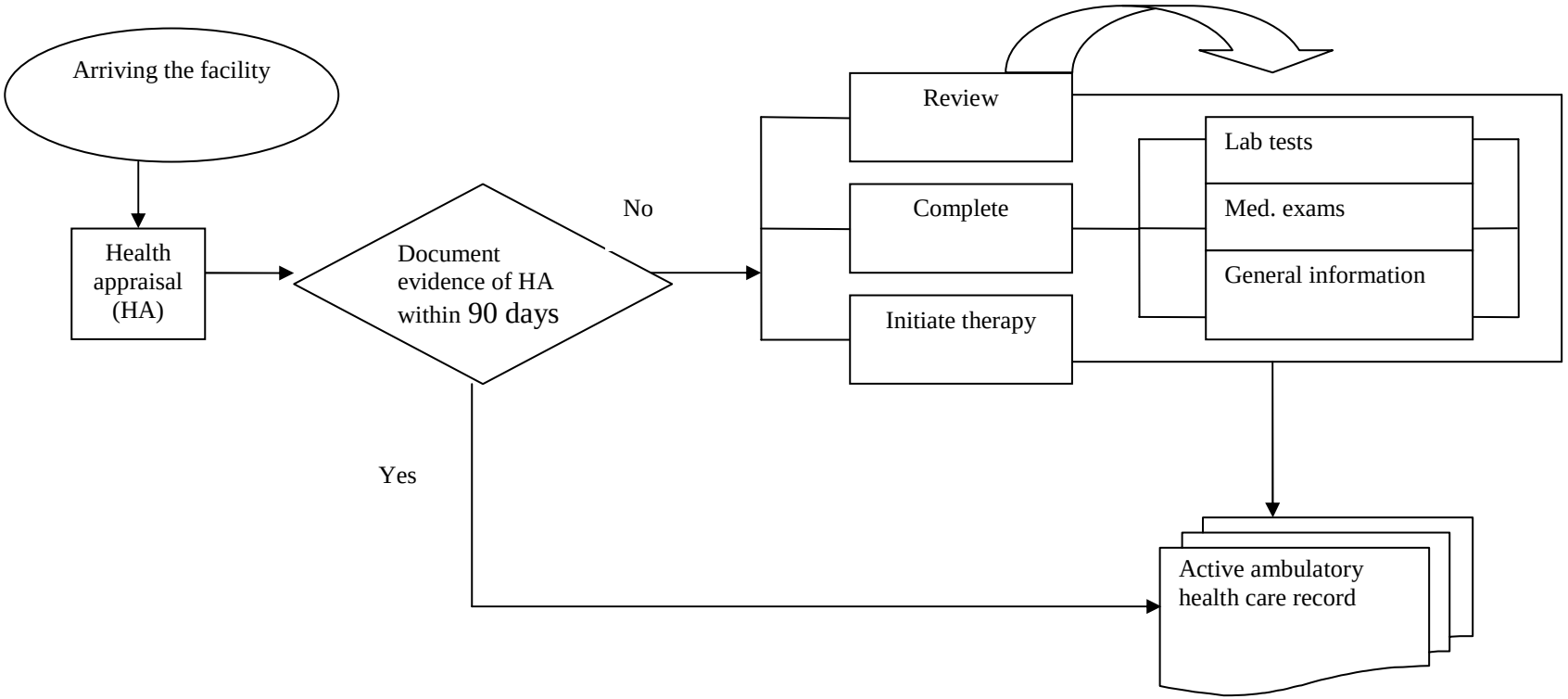
1. Overview: Creation of Records



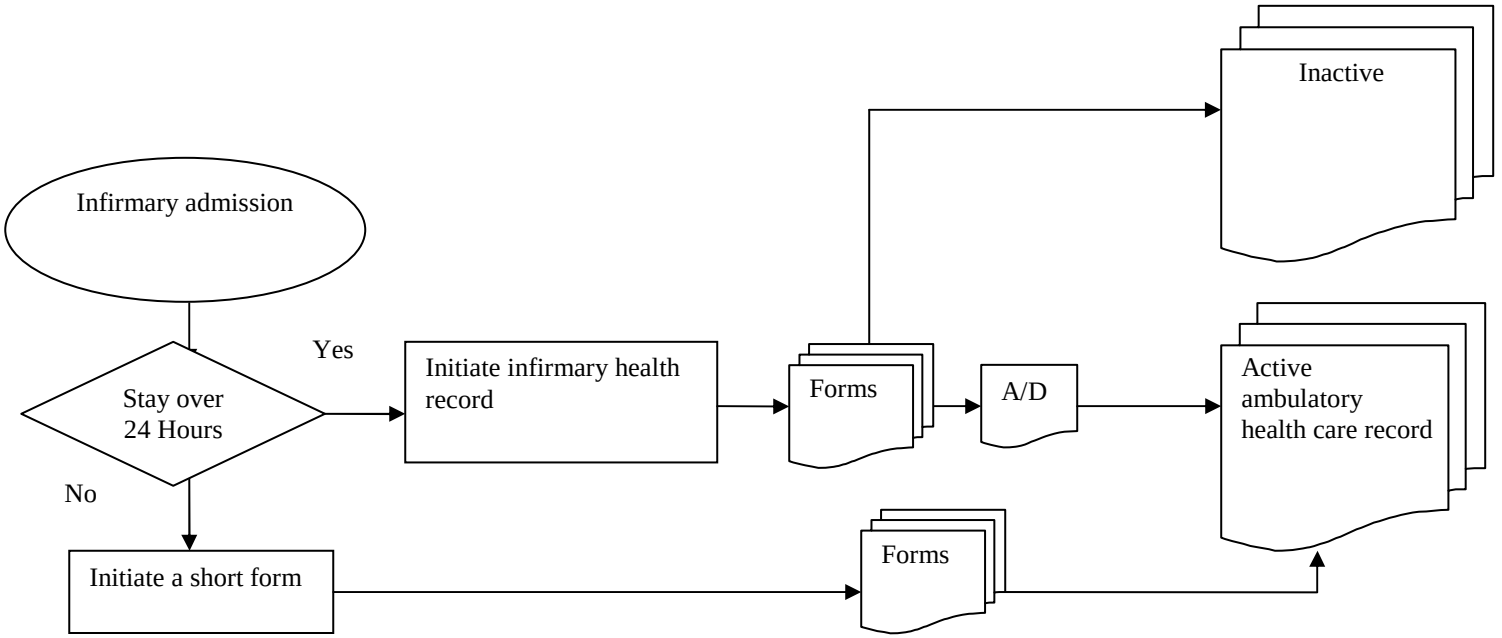
2. Sub-Process: Reception Center



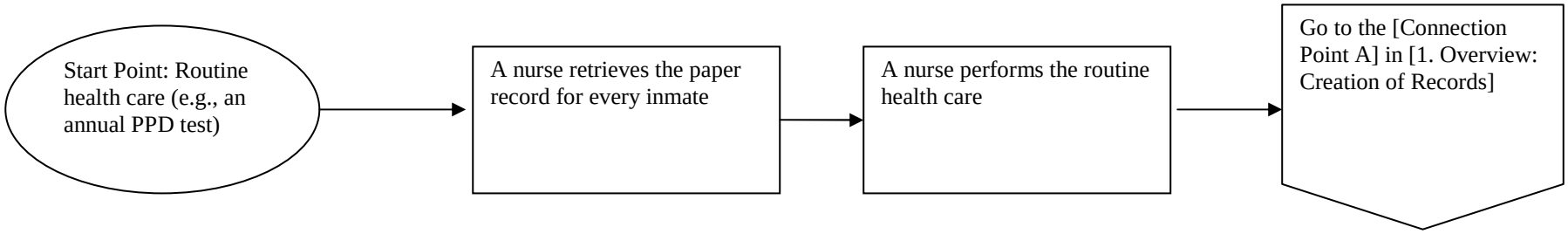
3. Sub-Process: Health Appraisal



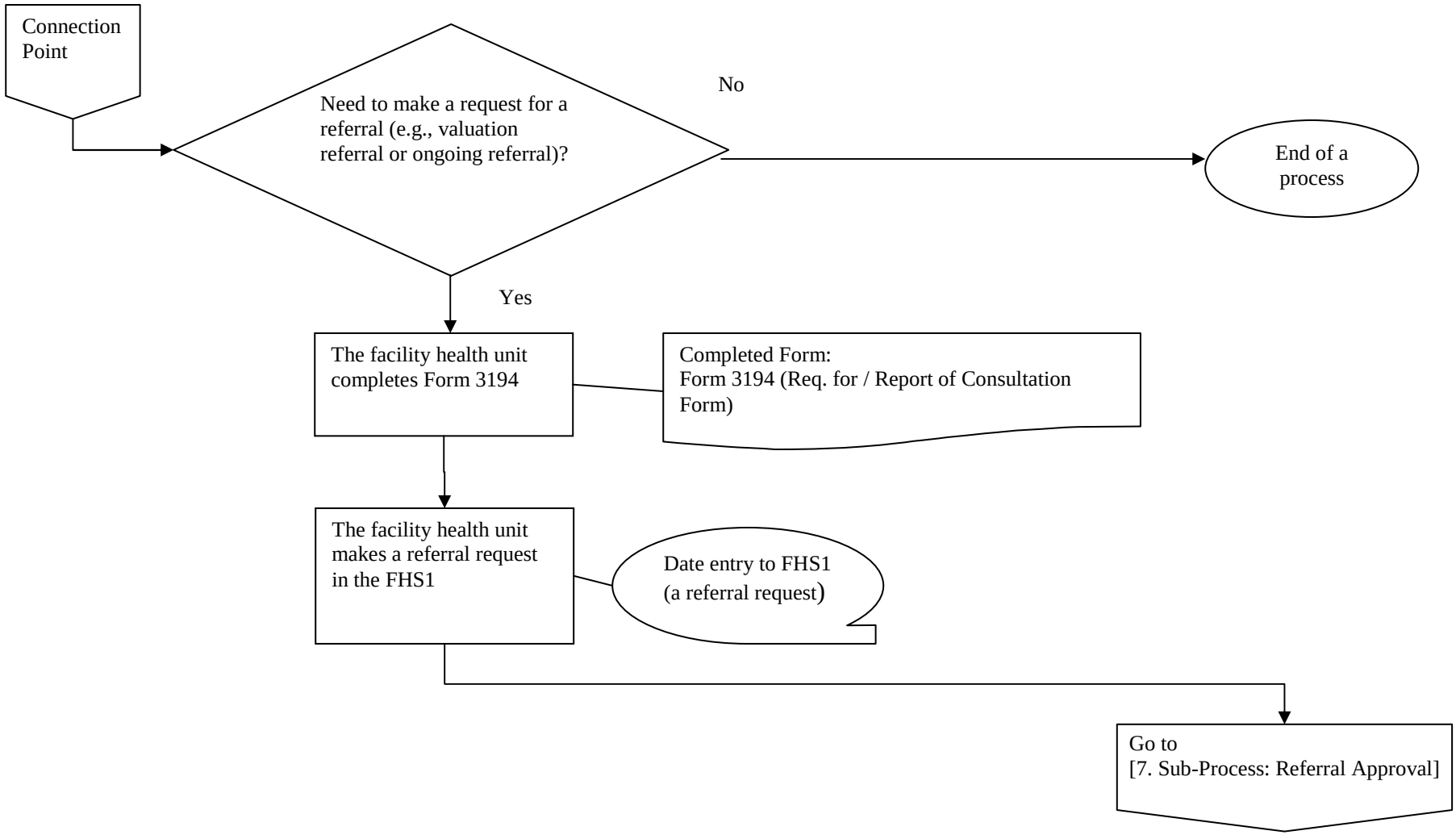
4. Sub-Process: Infirmary Setting



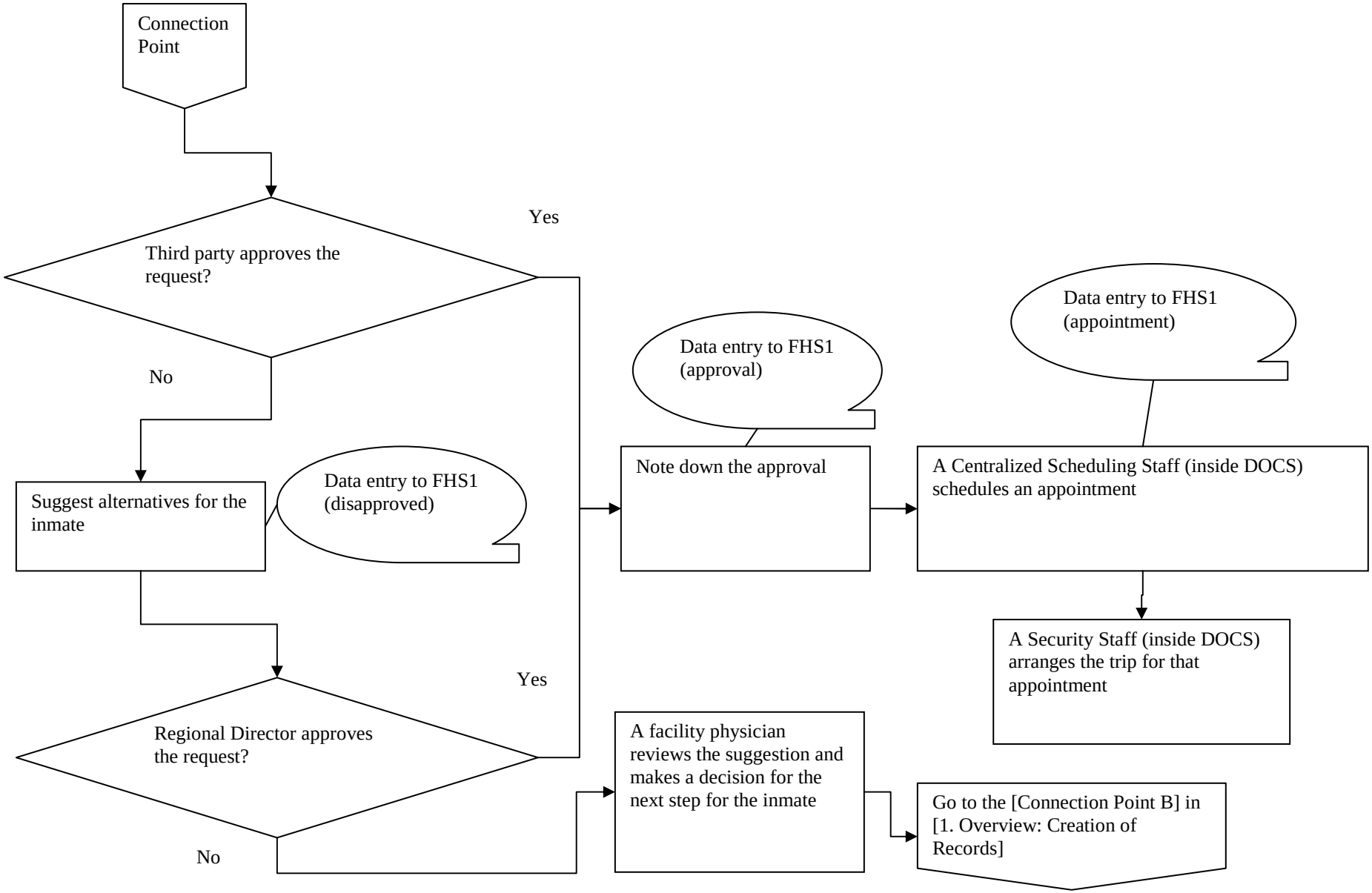
5. Sub-Process: Routine Health Service



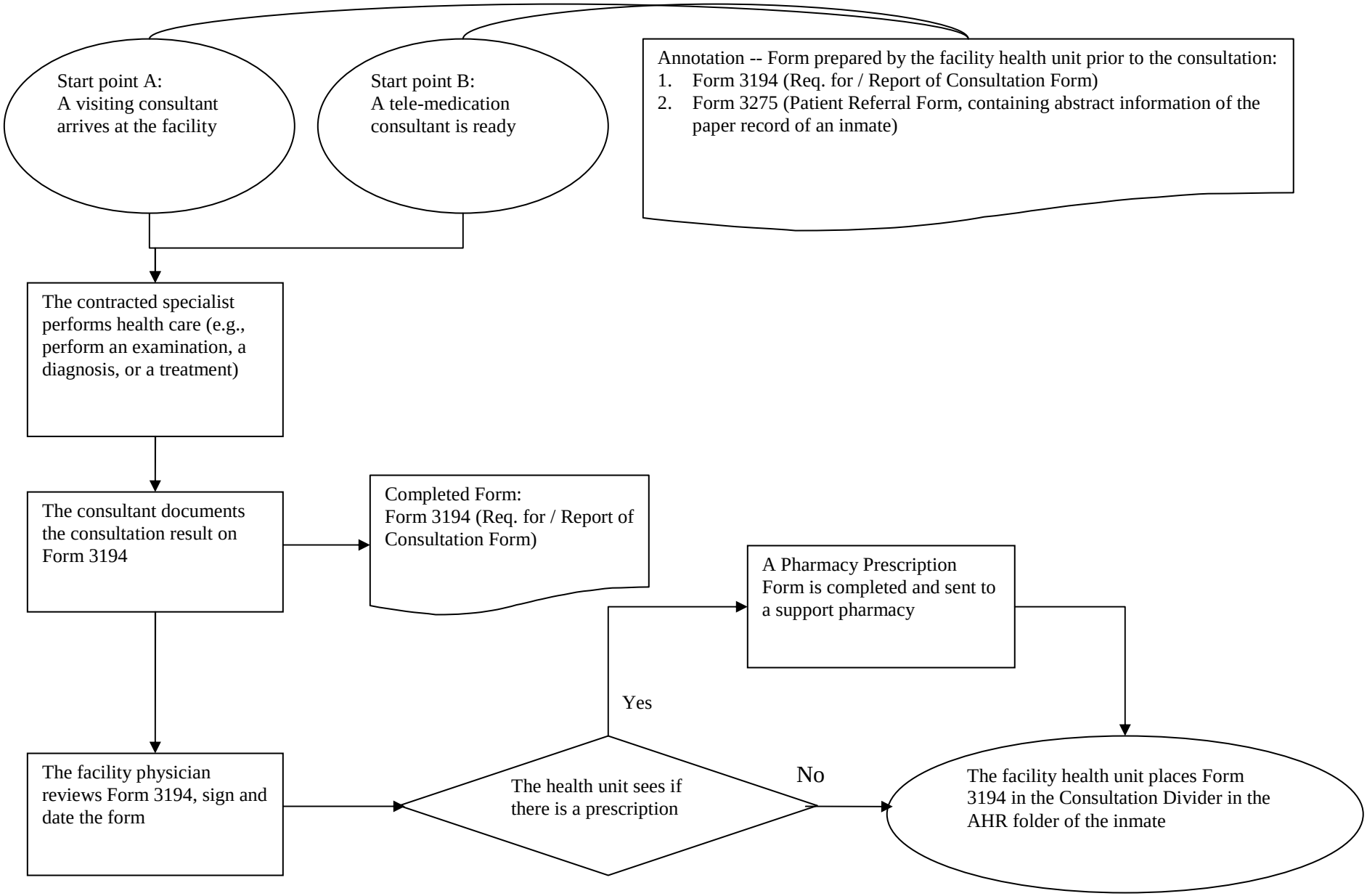
6. Sub-Process: Referral Request



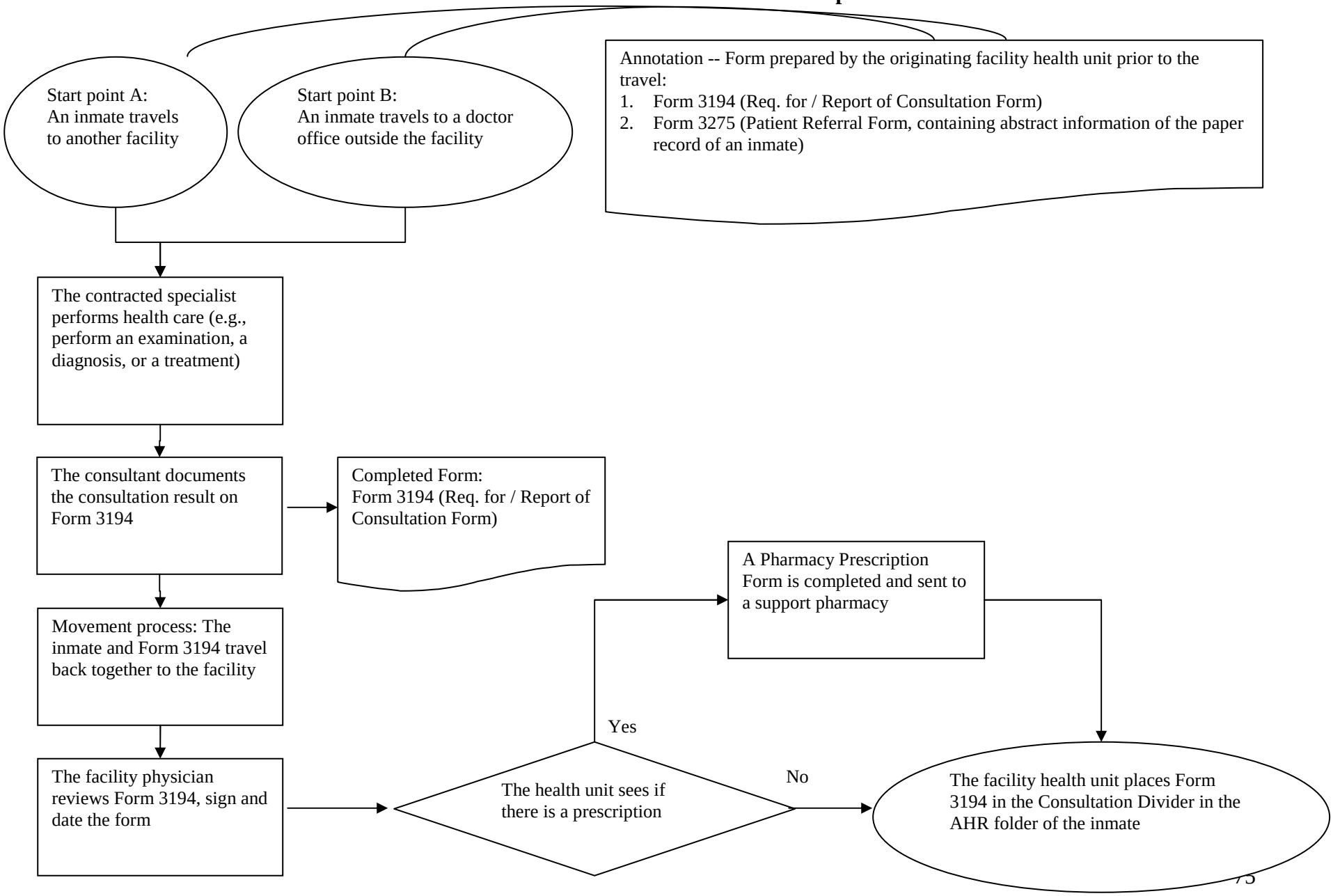
7. Sub-Process: Request Approval



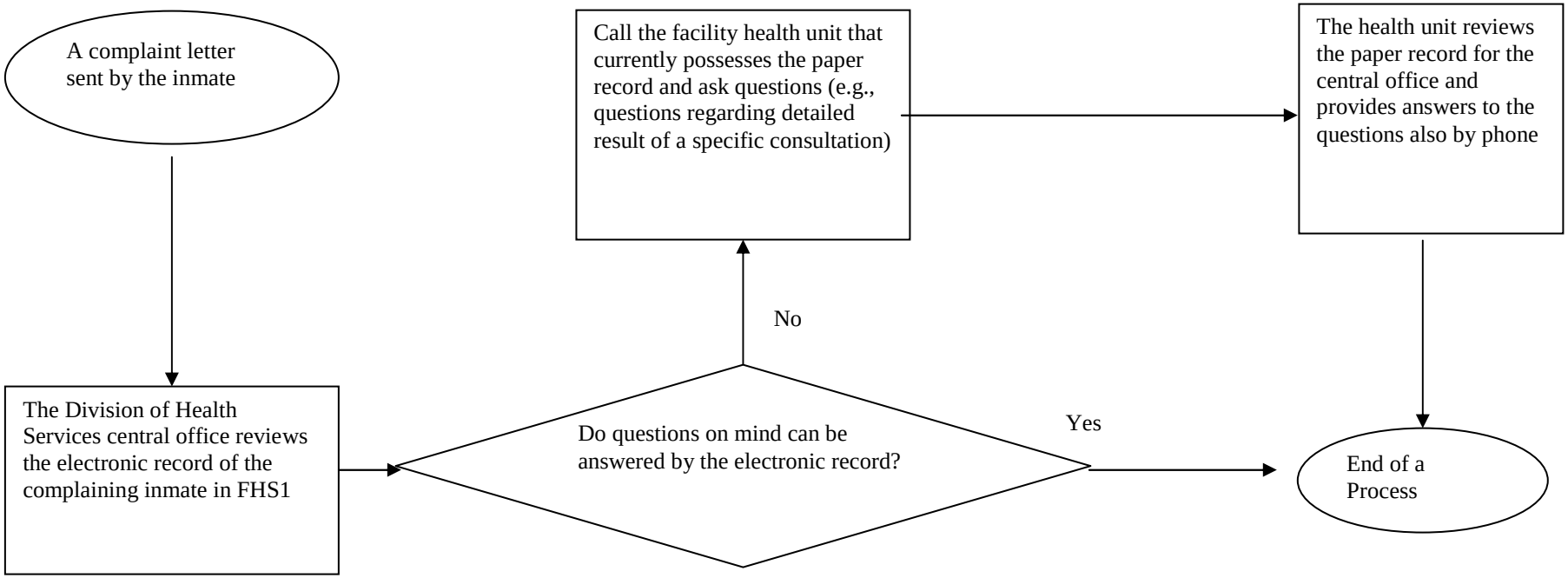
8. Sub-Process: Consultation without a trip



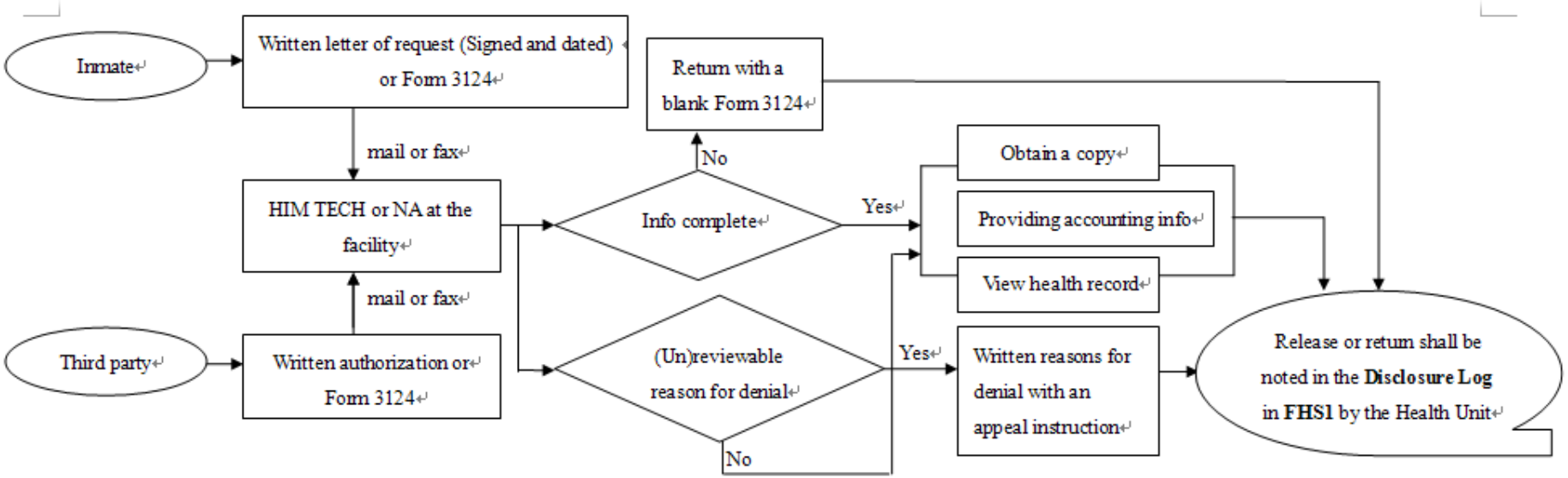
9. Sub-Process: Consultation with a Trip



10. Sub-Process: Information Review



11. Sub-Process: Information Request



Annotation –

- HIM TECH: Health Information Management Technician
- NA: Nurse Administrator
- Form 3124: Authorization for Use/Disclosure of Protected Health Information (including confidential HIV related info.)

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