# Customer Relationship Management and Electronic Medical Records: *How the Medical Industry is Transforming from Paper to Electronic Records*

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# Customer Relationship Management and Electronic Medical Records: *How the Medical Industry is Transforming from Paper to Electronic Records*

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Implementing CRM methodology in the Medical Industry can minimize errors and increase patient satisfaction

## *EXECUTIVE SUMMARY*

Customer Relationship Management (CRM) is increasing in popularity for a variety of reasons, including increased customer service levels, improved efficiency of call centers, simplified marketing processes, and increased ROI. Managers realize that customers are the heart of business success and are eager to realize the benefits a successful CRM implementation can deliver. CRM helps businesses use technology and human resources to gain insight into the behavior and value of customers.

With such focus on CRM, we first examine the definition of CRM. CRM is "any application or initiative designed to help an organization optimize interactions with customers, suppliers, or prospects via one or more touch points." [1] By enabling organizations to manage and coordinate customer interactions across multiple channels, departments and geographies, CRM helps companies maximize the value of every customer interaction and achieve improved corporate performance.

The market for CRM is estimated by Gartner to be between $30 million and $90 million over a 3-year period. Spending in 2001 equaled $8.8 billion and projections for 2005 are estimated at a shocking $30.6 billion. [12] Regardless of the massive spend associated with CRM, many businesses underestimate CRM costs by 40%-75%. Hidden costs are often found in the areas of:

- Project Management
- Software Integration
- Data Maintenance
- Training

However, despite the tremendous potential and proven ROI, industry surveys say that as many as 60 percent of CRM solution implementations fail the first time. Close examination of best practices from CRM successes and characteristics of failed CRM projects show that CRM can be highly effective, but must be implemented in a strategic, focused, and highly regarded manner that leads to success.

In determining if an organization is ready, you should consider if you have buy-in from all of the organization groups involved, and whether or not they understand their roles. In order to use CRM successfully, a company needs to have a CRM-focused vision. This means more than simply having one company department focus on CRM. It

means having the company's mission statement, strategies, goals and expectations all focused on CRM.

*80% of organizations report success with CRM solutions*

Findings from prior CRM implementations reveal the following best practices:

- Vision / Strategy – Clearly defining what success will look like and what initiatives will drive the desired results
- Knowing your Customer – Survey your customer to truly understand what the customer wants
- Differentiate – Segment your customers based on their habits, behaviors and profitability
- Technology / Data Requirements – Know what customer information is vital to successful implementation and what system the information will come from
- Metrics – Establish metrics and goals up front. The up-front commitment to metrics leads to quick resolution of problems and allows accurate tracking of progress
- Monitor – Monitor the progress, obtain feedback from the customer. This is essential to develop or revise a CRM strategy

This paper describes CRM through definitions, best practices, lessons learned and a review of CRM industry leaders. It reveals the managerial tactics associated with each area and additionally examines the dynamics of a case study in the medical industry. The purpose of this paper is to provide executive leadership an overview of CRM and show how others in the medical industry can follow suit and realize benefits of a CRM implementation.

Research for this paper includes a review of previous publications on the topic of CRM as well as one of the author's personal knowledge and interviews with various individuals at MU Healthcare. The focus of the interview was on CRM initiatives and their relationship to competitive strategy.

Electronic Clinical Information (ECI) or EMR demonstrates the application the synergy of IT and CRM in modern health care. Electronic Medical Records (EMR)'s benefits outweigh the high expenses associated with launching such a system. It can improve quality of care by making the information available at the right time and place of care, reducing medical errors, and improving the coordination of care. It improves health care providers' professional lives by providing a more efficient and effective working environment and lessening professional liability. Finally, it improves the hospitals and physicians' financial performance through more effective and efficient billing and collections, reducing medical errors and professional liability. The health care system's best benefit involves retaining and recruiting more satisfied and gratifying customers: patients, physicians and other health care providers.

## *INTRODUCTION*

Customer relationship management initiatives can be found at almost any organization at some level. Recently, CRM solutions are making way into the medical industry. While this is not the typical CRM solution, implementing modern information

technology in health-care settings has the potential to transform the delivery of health care for the better. CRM initiatives in the medical industry have four aims.

First, bringing electronic medical records (EMR) directly into clinical practice provides incentives for health care providers to change current practices and reduce the risk of investing in information technology.

Second, the introduction of EMR would create an interoperable infrastructure that will allow health information to become portable, moving with the patient from one point of care to another.

Third, patients' involvement in their own care will increase and finally, EMR will provide a better means of monitoring public health, measuring quality of care, and bringing medical research to the bedside.[13]

Before we look deeper into the medical industry, we first examine CRM in general.

## *A NEW DIRECTION*

CRM is a way of doing business, not just a technology. CRM solutions are successful because they align strategy, organization, business practices and incentives around the customer. These are further supported with technology. At the center of any successful CRM solution is a solid understanding of the customer around which a customer-centric strategy must be developed. To be effective, you must continually align your business practices around your strategy. Further, your technology must align with your strategy and business practices in order to implement CRM successfully.

With such focus on CRM, we first examine the definition of CRM. CRM is "any application or initiative designed to help an organization optimize interactions with customers, suppliers, or prospects via one or more touch points." [1] By enabling organizations to manage and coordinate customer interactions across multiple channels, departments and geographies, CRM helps companies maximize the value of every customer interaction and achieve improved corporate performance.

As an example, consider a company who is focused on their product and not the customer. This company will be limited in its attempts to become customer-centric by simply installing CRM technology. It takes more than technology for a successful CRM implementation. Likewise, a company that does not provide incentives for the sales force to share customer information will most likely be unsuccessful in implementing a contact management system.

This does not imply that organizations cannot implement several specific CRM solutions that support various products, provide superior customer service or help analyze customers. Organizations should pursue these solutions. However, they should give careful consideration to the prioritization and pursuit of CRM solutions that are consistent with their strategy and goals. They should also be equipped to revisit the strategy and goals of the organization as part of the implementation.

Customer relationship management is increasing in popularity for a variety of reasons, including increased customer service levels, improved efficiency of call centers, simplified marketing processes, and increased ROI. Managers realize that customers are the heart of business success and are eager to realize the benefits a

successful CRM implementation can deliver. CRM helps businesses use technology and human resources to gain insight into the behavior and value of customers.


Table 1

In addition to the customer insight, managers see CRM as important as "research has shown that companies that create satisfied, loyal customers have more repeat business, lower customer acquisition costs, and stronger brand value – all of which translates into better financial performance". 20 (See table 1)

## *CUSTOMER-CENTRIC FOCUS*

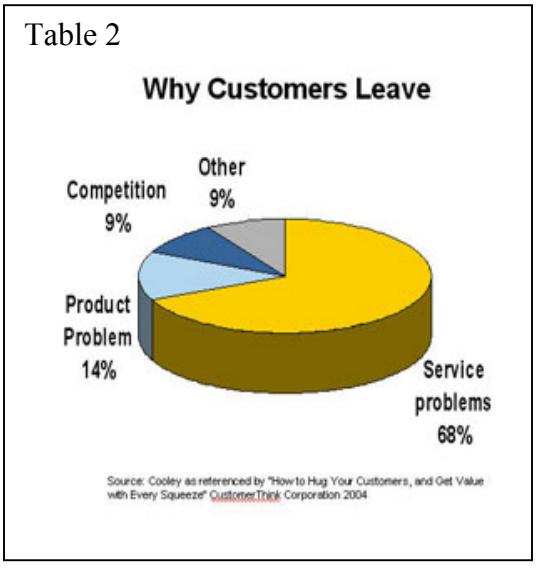
CRM is always about the customer! It's impossible to implement a CRM solution without fully understanding your customer. Organizations will benefit from research and analysis of the customer to find those that are most valuable. Industry best practice is to begin any CRM solution with customer analysis.

For CRM to be successful, the strategies of each company need to focus on the end-customer relationship. Although most companies focus on selling what they already make or offer, a company that is focused on the end-customer should focus on selling what the customer wants. Part of this customer focus includes measuring customer attitudes as the CRM system is implemented in order to determine if the program is improving customer information.

Organizations may experience diminished returns by applying CRM tactics equally to all customers. It is imperative to identify, segment, and profile customers based on characteristics such as interest, buying habits and service requirements in order to focus CRM efforts toward addressing the highest impact customers.

Studies indicate that increasing the number of customers a company retains each year by just 5% can increase contribution to shareholder value by 40% - 95%. 21, 22 Retention of customers gives greater benefit over the acquisition of new customers. With retention, organizations can build trust and loyalty as well as achieve cross-sell opportunities.

Table 2




If these are not incentive enough, consider that the average U.S. companies lose 20% of their customers each year. Multiply that by the 6-7 times additional costs it takes to acquire a new customer versus retention of a current customer! 8, 22 (See Table 2) With figures

such as these, managers truly see the benefit of knowing and servicing their customers.

## *A SNAPSHOT VIEW*

When organizations change the business and focus and organize around the customer, they must undergo the essential technology transformation. CRM technology must support and enable meaningful customer dialogue at all points of contact.

In CRM theory, each time a customer interacts with any of a company's touch points, the information that is collected (quantitative, qualitative, and behavioral) is sent to the company's systems database. This information is then deposited into a single CRM data warehouse where it is cleaned, analyzed, refined, shorted and made available for future interactions with the customer. [28] For example, if a customer now calls into a call center, the representative can now see their sales history, places they frequent, what they access the web for; not just their call history with the call center. This gives the representative the ability to personalize and customize the call by making references to recent sales, etc. Refer to Table 3 for a detailed map of the customer interaction.

common applications are database marketing, call centers, and field sales.

Infrastructure refers to how data is shared and connected across various applications. Transformation refers to the organizational change the company goes through to become truly customer-centric.

## *LEADING THE WAY*

There are several customer relationship vendors available to organizations today. However, four stand out as leaders in the industry: Siebel, PeopleSoft, SAP and Onyx.

Siebel is considered to be the industry leader, focusing its CRM efforts globally. Siebel's strategy is to provide CRM solutions for any kind of organization, any type of user, and any budget. The product offerings of Siebel include: Siebel Business Analytics, Siebel On Demand, Siebel Sales and Siebel Professional. [20]

PeopleSoft's strategy is to provide flexible and adaptable business solutions. They are not exclusively tied to CRM solutions. They also focus on back and front office interactions between all parts of an organization. Their lines of products include: PeopleSoft Enterprise, PeopleSoft Enterprise One and PeopleSoft world. [16]

Onyx sets itself apart from the other industry leaders in that they are based exclusively in the web platform. Their products include Onyx CRMExpress, Onyx Portable CRM and Onyx Analytics. Their strategy is to provide proven technology to business environments that need flexible, reliable and manageable CRM solutions. [18]

SAP prides itself in working with corporations in nearly every industry. SAP's mission is to provide collaborative business solutions for all types of industries and for every major market. Their products include: mySAP Business Suite, mySAP ERP and SAP xApps. [17]

## *THE BOTTOM LINE*

The market for CRM is estimated by Gartner to be between $30 million and $90 million over a 3-year period. Spending in 2001 equaled $8.8 billion and projections for 2005 are estimated at a shocking $30.6 billion. [12] Regardless of the massive spend associated with CRM, many businesses underestimate CRM costs by 40%-75%. Hidden costs are often found in the areas of:

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No matter what size an organization is, there's a CRM solution available. Depending on the needs and size of the organization, the costs can vary significantly. The expense of CRM projects can be overwhelming to some companies. Unless the CEO fully supports the CRM initiative, the funds are difficult to obtain for a CRM deployment.

> Many businesses underestimate CRM costs by 40% – 75% as a result of "hidden costs"

Small businesses can expect off-the-shelf contact management products to range from about $180 to $400, while application service providers typically hover in the $50 to $65 range per user, per month.

Mid-size businesses can expect to spend about $50 to $65 per user for hosted services while mid-market CRM software licenses can range anywhere from $2,500 to $4,000, depending on the suite. Consulting services, which are usually needed to fully exploit the technology, can push the price into the tens of thousands to implement.

The sky's the limit for large businesses. Software from the industry leaders such as Siebel, SAP, and PeopleSoft can cost millions to purchase and implement.

## *WHY IMPLEMENT?*

While costs can be staggering, customer relationship management is increasing in popularity for a variety of reasons, including increased customer service levels, improved efficiency of call centers, simplified marketing processes, and increased ROI. Managers realize that customers are the heart of business success and are eager to realize the benefits a successful CRM implementation can deliver. CRM helps businesses use technology and human resources to gain insight into the behavior and value of customers.

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### *WATCH OUT!*

Eager to cash in on the benefits, managers are jumping into CRM initiatives without properly researching proposed solutions. In addition to the hidden costs mentioned previously, managers often fail to consider the upkeep on CRM solutions after they are implemented.

CRM implementations are filled with complications and drawbacks. A major drawback, long deployment times and slow realization of benefits, often changes the anticipated ROI.

As many as 60% of CRM implementations fail the first time!

Another drawback to CRM is CRM vendors sometimes do not produce what was initially promised to the organization. Complete understanding of the organization and matching the technology to the strategy and goals of the business is necessary to achieve full benefits of CRM solutions.

Companies sometimes see a "quick hit" with a CRM implementation, causing problems down the road. Not fully considering all issues and options available, organizations set themselves up for CRM failure.

Despite the tremendous potential and proven ROI, industry surveys say that as many as 60 percent of CRM solution implementations fail the first time. Close examination of best practices from CRM successes and characteristics of failed CRM projects show that CRM can be highly effective, but must be implemented in a strategic, focused, and highly regarded manner that leads to success.

### *CRM – NOT JUST FOR THE CORPORATE SECTOR*

Now that so much has been established about CRM, its methodology, history, application, costs and benefits, we turn to view CRM as it relates to the medical industry.

In going back to the stated definition, we can substitute patient for customer and see how the definition applies to the medical industry. CRM, as applied to the medical industry is "any initiative designed to help an organization (physician / hospital)

optimize interactions with customers (patients) for the purpose of acquiring or maintaining satisfied customers (patients)" [1]

To better understand the application of CRM to electronic medical records (EMR), we first need to state the importance of electronic medical records in the health care industry. EMR are one of the best means of reducing medical errors. There's evidence using electronic health records reduces redundant or duplicate therapies. It has been found to automate practices the same way electronic technologies have automated other industries.

Oddly, if its automation is similar to other industries, health practitioners and patients question why it has taken so long to implement. The answer points to legal barriers and regulatory issues. The industry has not been prepared for the changes that electronic health records bring. The challenge is to clear the barriers to make certain this important technology comes forth. [10]

Patients question the expense related to the implementation of electronic medical records. In the short term, expenses could rise. However, the paper-based system used today is very inefficient, very labor intensive, and very error-prone. This manual process could not just be stopped and a switch flipped to convert to electronic records. A dual system would have to be in place for some period of time. [22]

But, there are several studies that show substantial long-term financial benefits in terms of reducing unnecessary admissions, reducing unnecessary referrals to specialists, reducing duplicate treatments and reducing the costs associated with evaluations. The savings are profound. The estimates range from 10 to 30 percent. [13]

To better understand the specifics, we examine the CRM solution of electronic medical records of MU Healthcare.

## *ELECTRONIC MEDICAL RECORDS - PUBLIC AND PRIVATE INITIATIVES*

Electronic medical records are becoming an essential part of modern health care system. The market for electronic health records (EHR) or electronic medical records (EMR) is huge and expanding. The estimated revenues for EMR software for physicians' clinical practices alone is $500 millions in 2004 and may reach $ 5 billions in 2008.[29] Government and private enterprises are promoting EMR or EHR in the hospitals and physicians'. On January 20, 2004, in his State of the Union address, President Bush declared EMR as one of the national agendas as he stated that every patient should have EMR or EHR within 10 years to avoid dangerous medical mistakes, to reduce costs and to improve care.[30] Recently, the federal Agency for Healthcare Research and Quality awarded $1.5 million grant to the 2500-physician Taconic Independent Practice Association to develop EMR that can be shared among physicians, laboratories, hospitals and health insurers in Hudson Valley. The grant's main goal was to improve healthcare's quality and efficiency in the community.[31] In Oregon, the Centers for Medicare & Medicaid Services initiated the Doctors' Office Quality Information Technology project to promote EMR in primary care physicians' offices.[32] In Massachusetts, Blue Cross & Blue Shield of Massachusetts planned to donate $50 millions to fund a pilot project to develop EMR for hospitals and health care providers in 3 communities. The project has

received a widespread support among insurers, hospitals and doctors.[33]

## *UNIVERSITY OF MISOURI HEALTH CARE - A FRONT RUNNER IN ELECTRONIC HEALTH INFORMATION*

Transition from paper medical records (PMR) to EMR requires strong physician leadership and major institutional commitment of human and capital resources. University of Missouri Health Care's EMR/EHR project has demonstrated such a commitment to make it a reality. University of Missouri Health Care consists of 2 operational entities: (i) School of Medicine (SOM) that consists of University Physicians (UP), a physician faculty's medical practice; and (ii) MU Health Care that runs University Hospital (UH), Columbia Regional Hospital (CRH), and the clinics.

## *MU SCHOOL OF MEDICINE – A PIONEER IN PROBLEM-BASED MEDICAL EDUCATION*

MU School of Medicine was established in 1872 as a two-year program and expanded into a four-year program in 1956. The School of Medicine's primary functions include training medical students to become competent and caring physicians, conducting innovative biomedical research, and providing excellent medical services, the latter through University Physicians, a physician faculty's medical practice plan. The school is a pioneer in problem-based medical education that is characterized by problem solving, self-directed learning and early clinical experience.

The top leadership team of SOM consists of the Dean, the associate deans (research; medical education and faculty development; finance; alumni; and clinical affairs), chairpersons of basic science departments (biochemistry; pharmacology and physiology; and microbiology and immunology) and chairpersons of clinical departments (medicine; neurology; general surgery; orthopedic surgery; obstetrics, gynecology and women's health; pediatrics; family and community medicine; psychiatry; dermatology; ophthalmology; pathology and laboratory medicine; radiology, and rehabilitative medicine). University Physicians (UP) is a group practice of 370 faculty physicians with 265 supporting staff and has revenue of about $110 millions. University Physicians spends about $ 2.7 million or 2.5% of revenue on information technology (IT) and maintains IT staff of 22 persons. University Physicians utilizes EMR extensively for patient care and the IDX system for scheduling patients and submitting patient charges electronically to the insurance or managed care companies.

## *MU HEALTH CARE – THE ONLY QUARTERNARY AND LEVEL I TRAUMA HEALTH CARE SYSTEM IN CENTRAL MISSOURI*

MU Health Care consists of University Hospital (UP), Columbia Regional Hospital (CRH), Ellis Fischel Cancer Center and Clinics. The top leadership team of MU Health Care includes Executive Director, Chief Financial Officer (CFO), Chief Informational Officer (CIO), and Hospital Directors of UP and CRH. University Hospital (UH) is a major quaternary-care hospital and level I trauma center in Central Missouri. It has 260 beds and provides all medical services except women's health and neonatal intensive care. In 2003, it served

11,532 in-patients. Columbia Regional Hospital is a 262-bed acute care hospital that provides medical services in general surgery, orthopedic surgery, urology, general medicine and women's health services. It houses the Family Birth Center and Neonatal Intensive Care Unit (NICU). In 2003, it served 6,477 in-patients. Ellis Fischel Cancer Center provides comprehensive, multidisciplinary outpatient care for cancer patients and conducts cancer medical research.

In 2003, MU Health Care has a workforce of 5700 employees and revenue of $620 millions. It served about 18,009 in-patients and 544,395 out-patient visits. It has IT staff of 108 employees or 1.9% of the workforce and spends about $13.5 millions or 2.2% of the revenue. The IT budget is split about evenly between personnel and software, hardware and consultation.

## *MU HEALTH CARE' S LAUNCHING ELECTRONIC CLINICAL INFORMATION*

MU Health Care's main customers are health care providers and patients. Electronic clinical information (ECI) - hospital clinical information system (CIS) and electronic medical records (EMR) - is the organization's effort to recruit and retain customers through improved operational efficiency and quality of care. This project has been a long process and required the top leaders' strong commitment and significant resources. The project was started in the Fall of 2001 when the Vice Chancellor for University of Missouri Health Care and top leadership of both SOM and MU Health Care committed to developing ECI. Appointment of a physician leader as a liaison between IT leadership and physicians was an important step toward the project's success. As a project champion, the physician leader has vigorously promoted the project to the physicians and effectively communicated the physicians' concerns and suggestions to the IT team. In December 2001, Cerner Corporation was selected as a technical provider to implement a system-wide ECI. MU Health Care paid a fix fee for licensing and a consulting fee for additional services. In 2002, the project was launched but progress was impaired by MUHC's fiscal situation. In September 2003, MUHC hired outside consultants to renegotiate the contract with Cerner for better terms then reactivated the project on an accelerated time frame. In general, the cost of converting paper medical records to electronic medical records is $10,000 – 30,000 per physician and the cost of electronic clinical information is between $50 millions – $100 millions for health care system of 2- 3 hospitals.[33,34]

## *MU HEALTH CARE' S IMPLEMENTING ELECTRONIC CLINICAL INFORMATION*

Implementing ECI for MU Health Care (MUHC) is a multi-step process due the project's wide scope and complexity. In many aspects, ECI transforms the culture and the way the system delivers health care services. In addition to replacing paper documentation with electronic one, MUHC has to replace multiple software systems with Cerner software so that all clinical information can be integrated and be available on-demand to users across the system. The two hospitals use different software vendors for the same purpose between the hospitals or for different purposes within the same hospital as shown in Table 4.

## *MU HEALTH CARE' S ELECTRONIC CLINICAL INFORMATION - ACCOMPLISHMENTS*

MU Health Care has accomplished a great deal since the launch of the project in 2002 despite its short period of financial difficulty. The PowerChart is the soul of MUHC's electronic clinical information. PowerChart allows on-demand access to medical records, creation of physicians' electronic documentation and execution of physicians' orders. The clinical information is flowed into the central data center and retrieved through PowerChart. Currently, Cerner runs the off-campus central data center.

PowerNote is an application within PowerChart that allows clinicians to create on-line documents by using electronic templates that are structured documents such as consultation notes, admission notes, progress notes, operative notes and discharge summary notes. These documents comprise the bulk of physicians' documentation. Clinicians can select the choices within the templates, import information from other documents by copying and pasting, type in free text and securely and electronically sign them. UM Health Care is in the forefront of implementing PowerNotes: over 100,000 notes have been completed. Appendix B is an example of the OB/Gyne consultation note that was generated through PowerNote.

UH Emergency Department (ED)'s FirstNet is another accomplishment. FirstNet allows ED personnel to track progress of the triage and treatment of patients seen in the E.D. The central monitor instantly displays the information about the patients' complaints, diagnosis, tests' results, treatments and locations of patients. FirstNet has improved the efficiency of ED's operation and patient satisfaction.

MUHC plans to complete the following projects in 2005: (i) imaging all the old clinical and financial records to make them available on-line; (ii) replacing all of other vendors' existing software applications with Cerner's for radiology, pharmacy, pathology and blood bank; (iii) on-line electronic documentation for all in-patients' services at both hospitals; and (iv) making all clinics "PowerChart offices" with complete on-line documentation.

Table 4

| | UH | CRH |
|---|---|---|
| Medical records | Cerner | HBOC |
| Physician orders | Cerner | HBOC |
| Materials management | Procure | IMMS |
| Clinical pathology | ALG (UH only) | ALG (CRH only) |
| Anatomic Pathology | CoPath M | Western star |
| Pharmacy | Pharmakon | HBOC |
| Operating room | SurgiServ | ORSOS |
| Radiology | MARS | HBOC |

## *HEALTH INSURANCE PORTABILITY AND ACCOUNTABILITY ACT (HIPAA)*

Health Insurance Portability and Accountability Act (HIPAA) requires that

comprehensive policies and procedures be established to safeguard EMR and patient confidentiality. MU Health Care has established public key cryptography to ensure secure access to the patient information. Only appropriate personnel can access to the medical records by entering correct usernames and passwords. In addition, MUHC continues monitoring employees' access to EMR or EHI and prohibits employees to view even their own medical records. Violation of the rules is a ground for discharge.

## *CERNER CORPORATION – AN ESSENTIAL PARTNER*

Cerner Corporation was founded in 1979 and is headquartered in Kansas City. It is a leading supplier of healthcare information technology, with more than 5,273 associates and 1,500 corporate clients worldwide. In 2003, it had revenue of $839.6 million and net income of $42.8 million. It offers software and services to improve quality of patient care by seamlessly delivering health information such as laboratory results, images, medication and allergy data to health care teams that depend on complete, timely information. It enables executives to manage resources, comply with regulations and recognize trends and best practices by combing clinical, operational and financial data from across the enterprise and the industry.[35]

## *MUHC's GOALS FOR ELECTRONIC CLINICAL INFORMATION*

MUHC's goals for the ECI project are three-fold: (i) improving quality of patient care as evidenced by better health outcomes and higher patient satisfaction; ii) creating a better working environment for health care providers through improved efficiency, decreased overhead cost, higher revenues and less medicolegal risk; and (iii) enhancing its financial performance through decreased costs and increased revenues.

## *EMR IMPROVES QUALITY OF PATIENT CARE – TIMELY AVAILABILITY OF CLINICAL INFORMATION*

The traditional paper medical information has many drawbacks. First, its untimely availability affects the quality of care. Let's look at an obstetrical patient's medical journey through the health care system. At her first prenatal visit, she provides extensive demographic and medical information then receives physical examination and laboratory tests. At her subsequent prenatal visits, she reports her concerns, receives physical examination, assessment of her fetus and other testing such as blood tests and ultrasound examinations. All of the information is summarized in her prenatal record as shown in Appendix C. If she presents to the hospital for pregnancy complications or labor and delivery, the information on her prenatal records may not be available to treating physicians. At present, boxes of prenatal charts are physically carried from the outpatient clinics to the hospitals every evening and brought back to the clinics in morning every weekday. The boxes of charts are left at the hospital through the weekend. Furthermore, once she is in the hospital, her prenatal chart will accompany her to different nursing stations as she moves from unit to unit. Her chart may be lost because so many parties use it at different locations. A great deal of nurses and physicians' time is wasted in looking for the missing charts. In many cases, tests such

as blood type, screening for infection with syphilis, hepatitis B and group B streptococcus must be repeated because the information affects caring of the newborns.

## *EMR IMPROVES QUALITY OF PATIENT CARE – REDUCING MEDICAL ERRORS*

Electronic health information can improve quality of health care by reducing medical errors, the latter occurs as a result of failure in execution of plan and its details or use of wrong plan. Medical errors can be characterized as an adverse event that causes injury or death of a patient or a near miss event or situation that could have resulted in adverse event but did not. Medical errors occur because of the complex nature of medical care. There are so many parties and activities involved with each patient in the hospital. In fact, in an ICU setting, each patient receives an average of 178 "activities". Thus, 99% proficiency rate means 1.7 errors per patient per day and even 99.9% may not be safe enough. In 1999, the Institute of Medicine reported that more than a million injuries and nearly 100,000 deaths occurred yearly because of medical errors.[36]

In general, physicians, nurses, pharmacists are highly trained, careful, and dedicated professionals who may not be aware of the scale of medical errors. Although, human error is the proximate cause, most errors are symptoms of the underlying systemic disorder as in the disasters of Three Mile Island's nuclear plant and the space shuttle Challenger's mission. Electronic health information is one of the solutions to the systemic disorders of the health care delivery. Dr. David Bates, Chief of Medicine at Brigham and Women's Hospital and a leading researcher on medical errors, reported that computerized physician order entry (CPOE) in the hospitals reduced nonintercepted serious medication errors by 55% from 10.7 events per 1000 patient-days to 4.86 events per 1000 patient-days. [37] Bates recently also recommended the use of information technology to communicate key medical information across the system to reduce the frequency of medical errors. [38]

## *EMR MAKES THE MEDICAL PRACTICE MORE EFFICIENT AND EFFECTIVE*

Electronic health information makes the physicians' professional lives better. Physicians' direct patient care involves processing information, applying technical skills and knowledge and building relationship with patients and other health care providers. The physicians start with a baseline knowledge and experience, acquire information from the patient, supplement with examination, diagnostic testing and current medical information, formulate a plan of care and communicate it to patients and other health care providers.

Good communication to other physicians is important in building a practice while reducing medical errors. MU Health Care's ECI make the communications much easier and timely. The physicians within MUHC system can communicate to each other through the electronic InBox. Communication to physicians outside MUHC could be readily and timely accomplished by automatic facsimile. MUHC's future plan includes allowing referring physicians outside the network to access to their patients' records through the InBox.

Electronic medical records improves the quality of documentation, thus make it more

effective to defend a professional liability law suits. More lawsuits are defended because of good record keeping than because of actual events. Credibility of medical records is adversely affected by delayed filing of laboratory results, incomplete files and illegibility, loss, alteration, fabrication or concealment of medical records. EMR would eliminate or significantly reduce all of the above deficiencies except the last three.

Finally, EMR could enhance the physicians' plan of care. The most appropriate plan of care requires the presence of all needed information at the point of decision-making. This concept means that everything now available on paper spread out across a system of care is available instantly in an organized, retrievable fashion at all locations of care via the EMR. In addition, on-line medical information resources such as online UpToDate are available to physicians to obtain current information on the diagnosis or treatment. Furthermore, the patient data could be readily retrieved for continuous quality & safety improvement.

## *EMR INCREASES REVENUES AND REDUCES COSTS FOR BOTH HOSITALS AND PHYSICIANS*

EMR increases revenues and reduces costs of providing medical care for both physicians and hospitals. Both entities increase revenues from having more satisfied patients and referring physicians. Both parties benefit from increased efficiency involving billing, collection and elimination of duplication of effort. Our patient described above must provide the same demographic and health insurance information to the hospital personnel at the time of admission, the same information on her prenatal records. Similarly, the physician's admission notes and discharges notes contain much repetitive medical information. In addition, it takes much more time and effort to execute a physician's manual orders compared to CPOE ones. For example, it takes about 30 minutes from the time a physician writes an order until a pharmacist receive it compared to less than a minute with CPOE.

EMR allows hospitals and physicians to collect more payments from health insurance companies at a lower cost. Health insurance companies have created a great deal of rules and barriers to avoid or reduce payments for medical services to physicians and hospitals. They usually require good documentation about the services to be attached to the bills; the latter must be submitted within certain period of time. Interface of EMR and the IDX system eliminates reentering patient information into the charge tickets and allows attaching the documentation along with the bills timely. EMR would save millions of dollars of labor costs spent on obtaining information from the medical records and addressing the insurance companies' denials. EMR increases insurance companies' payment to hospitals and physicians from correct and timely submitting the charge tickets.

Electronic Medical Records also saves physicians and hospitals' other costs of conducting business. For example, a clinical department may spend from $100,000 to $500,000 for transcription services a year depending on the volume of clinical activities and number of faculty. More significantly, EMR has positive impact the less apparent but costly expenses such as those associated with medical errors and professional liabilities. University of Vanderbilt Medical Center estimated its cost of medical errors at about $750 million last year.

At the end, MUHC probably reaps the most benefits from ECI because retaining more physicians and patients is much more cost effective than recruiting the new ones. Furthermore, any additional patient day increases its margin because of its high fixed cost.

## *CONCLUSIONS*

Electronic Clinical Information (ECI) or EMR demonstrates the application the synergy of IT and CRM in modern health care. ECI's benefits outweigh the high expenses associated with launching such a system. It can improve quality of care by making the information available at the right time and place of care, reducing medical errors, and improving the coordination of care. It improves health care providers' professional lives by providing a more efficient and effective working environment and lessening professional liability. Finally, it improves the hospitals and physicians' financial performance through more effective and efficient billing and collections, reducing medical errors and professional liability. The health care system's best benefit involves retaining and recruiting more satisfied and gratifying customers: patients, physicians and other health care providers.

## *REFERENCES*

1.Goodhue, D. L., Wixon B. H., and Watson, H. J., "Realizing Business Benefits Through CRM: Hitting the Right Target In The Right Way" *MIS Quarterly Executive,* Vol. 1, 2, 2002, pp. 79-96.
2.Swift, Ronald S., "Executive Response: CRM is Changing Our Eras, the Information we Require, and our Processes" *MIS Quarterly Executive*, Vol 1, 2, 2002, pp.95-96.
3.Chin, Tyler, *"Data Mining,"* American Medical News, Vol 46, p. 19.
4.Swartz, Nikki, "Doctors, Hospitals Advised to Keep Records Electronically" *Information Management Journal*, Vol 38, 1, 2004, p.9.
5.Swartz, Nikki, "A Prescription for Electronic Health Records" *Information Management Journal*, Vol 38, 4, 2004, p.20-22.
6.Finkelstein, Joel B., "Health IT chief: Public-private partnership needed for EMRs" *American Medical News*, Vol 47, 28, pp. 5-6.
7.Pastore, Michael, *"CRM Spending Increases Despite Myriad of Market Players,"* November 2, 2000; http://www.clickz.com/stats/big_picture/hardware/article.php/5921_502171; last accessed on October 11, 2004.
8.http://www.crmtrends.com/crm.html; last accessed October 28, 2004.
9.McGovern, Todd and Panaro, Joseph. "The Human Side of Customer Relationship Management" *Benefits Quarterly,* Vol. 20, 3, 2004, pp. 26-33.
10.Powers, Thomas L., and Bendall, Dawn. "The Influence of Time on Changes in Health Status and Patient Satisfaction". *Health Care Management Review*. Jul-Sep 2004. Vol. 29, 3; pp. 240-248.

11.Vandermerwe, Sandra. "Achieving Deep Customer Focus," *MIT Sloan Management Review*. Spring 2004. Vol. 45, 3; pp. 26-34.
12.Mello, A., *"Watch out for CRM's hidden costs"* October 17, 2001; http://techupdate.zdnet.com/techupdate/stories/main/0,14179,2818263,00.html; last accessed on October 29, 2004.
13.Miller, Robert H. and Sim, Ida. "Physicians' Use of Electronic Medical Records: Barriers and Solutions*." Health Affairs*: Mar/Apr 2004. Vol. 23, 2; p.p. 116-126.
14.Krass, P., *"CRM: Once More, Without Reeling"* March 17, 2003; http://www.cfo.com/article/1,5309,8948/BS/12/4,00.html; last accessed October 15, 2004.
16.http://www.peoplesoft.com; last accessed October 17, 2004.
17.http://www.sap.com; last accessed October 17, 2004.
18.http://www.onyx.com; last accessed October 17, 2004.
19.http://www.amdocs.com; last accessed October 17, 2004.
20.http://siebel.com; last accessed October 17, 2004.
21.Spitz, Keith. "Lessons Learned by a CRM Veteran." *Computerworld*. Sep 20, 2004. Vol. 38, p. 26.
22.Bleicher, Paul. "An Imposing Change." *Pharmaceutical Executive*. Jun 2004. p.p. 26-30.
23.Lipscomb, Darrin, "Making the Case for Customer Relationship Management*"* CRM Guru, April 12, 2004; http://www.crmguru.com/articles/2004/Making the Case for Customer Relationship Management; last accessed October 15, 2004.
*24."Making the most of CRM"* http://www.pharmafile.com/pharmafocus/Features/feature.asp?fID=357&m=7; last accessed October 12, 2004
25.http://guide.darwinmag.com/technology/enterprise/crm/index.html?; last accessed September 27, 2004.
26.Nelson, Scott, "*Eight Building Blocks of CRM"* Gartner Group, June 19, 2003; http://www2.cio.com/analyst/report1483.html; last accessed October 25, 2004.
27.Nancarrow, Clive and Rees, Sharon and Stone, Merlin, "New Directions in Customer Research and the Issue of Ownership: A Marketing Research Viewpoint," *Journal of Database Marketing*, Vol. 11, 1, 2003, pg. 2
28.Dyche, J., *The CRM Guide to Customer Relationship Management*, Addison-Wesley, Boston, 2002
29. Jane Larson, "Medical records go online", *The Arizona Republic*, October 14, 2004
30. http://www.prnewswire.com/cgi-bin/stories.pl?Acct=109&Story, viewed on 10/31/2004
31. http://midhudsonnews.com/News/medrec_sec_grant-21Oct04.htm, viewed on 10/31/2004
32. http://portland.bizjournals.com/portland/stories/2004/10/11/daily34.html, viewed on 10/31/2004
33. Kowalczyk L, "Statewide medical records planned: Blue Cross to give $50m to boost electronic project", *Global Staff*, October 21, 2004
34. McGee MK, Informationweek.com/story/showArticle.jhtml, viewed on 10/31/2004
35. http://www.cerner.com/aboutcerner/default.asp, viewed on 10/31/04
36. Kohn LT, Corrigan JM, Donaldson MS (eds), *To Err is Human: Building a Safer Health System*. Washington, DC: National Academy Press, 1999.
37. Bates DW, Leape L, Cullen DJ, et al., "Effect of Computerized Physician Order Entry and a Team Intervention on

Prevention of Serious Medication Errors" *JAMA*, Vol. 280, 1998, pp. 1311-1316.

38. Bates DW, Cohen M, Leape L, et al., "Reducing the Frequency of Errors in Medicine Using Information Technology" J Am Med Inform Assoc, Vol. 8, 2001, pp 299-308.

## APPENDIX A – CRM INDUSTRY LEADERS

There are several customer relationship vendors available to organizations today. However, four stand out as leaders in the industry: Siebel, PeopleSoft, SAP and Onyx. Refer to Table A for information on each.

**Table A**

| | |
|---|---|
| SIEBEL.<br>20 | • Company Information<br>▪ Headquarters in San Mateo, California<br>▪ Founded 1993; 5000 employees<br>▪ 2.8 million users at 4,000+ organizations<br>▪ 2003 revenue - $1.35 billion<br>◆ Strategy<br>▪ "CRM for Everyone" – CRM software solutions for any kind of organization, any type of user, and any budget<br>• Product Offerings<br>▪ Siebel Business Analytics ▪ Siebel On Demand<br>▪ Siebel Sales ▪ Siebel Professional |
| PeopleSoft®<br>16 | ◆ Company Information<br>▪ Headquarters in Pleasanton, California<br>▪ Founded 1987; 12,000 employees<br>▪ Serving 12,200 organizations<br>▪ 2003 revenue - $2.3 billion<br>◆ Strategy<br>▪ Flexible and adaptable business solutions<br>◆ Product Offerings<br>▪ PeopleSoft Enterprise ▪ PeopleSoft Enterprise One<br>▪ PeopleSoft World |
| SAP<br>17 | ◆ Company Information<br>▪ Headquarters in Waldorf, Germany<br>▪ Founded 1972: 30,000 employees<br>▪ 2.8 million users; 1,500 partners<br>◆ Mission<br>▪ To provide collaborative business solutions for all types of industries and for every major market<br>◆ Product Offerings<br>▪ mySAP Business Suite ▪ mySAP ERP<br>▪ SAP xApps |
| ONYX SOFTWARE<br>18 | ◆ Company Information<br>▪ Headquarters in Bellevue, Washington<br>▪ 900 customers in 50 industries<br>◆ Strategy<br>▪ Through three audience-specific portals, Onyx Enterprise CRM provides proven technology ideal for business environments that need flexible, reliable and manageable CRM<br>◆ Product Offerings<br>▪ Onyx CRMExpress ▪ Onyx Portable CRM<br>▪ Onyx Analytics |

## APPENDIX B – OB/GYNE CONSULTATION NOTE

Result type: OB GYN General Clinic Note
Result date: Thursday, June 10, 2004 9:38 AM
Result status: Final
Result title: OB/GYN Consult Note
Performed by: on Thursday, June 10, 2004 9:38 AM
Encounter info: , UNIVERSITY HOSP, UH SHORT STAY, 5/3/2004 - 5/3/2004

*** Final Report ***

**OB/GYN Consult Note**

Patient:
FIN:
Age: **34 Years** Sex: **Female** DOB: **3/2/1970**
Author:

**Visit Information**
**Reason for Consultation**
Premature Labor.

**Chief Complaint**
Patient states she is having preterm contractions every hour lasting 3 minutes
Asdfasdfasdfasdfasdfa

**Associated Symptoms**
**None**

**Medications**
**Home Medications**
One a day vitamin supplementation.

**Allergies**
Allergy/reaction profile (all):
codeine, penicillin, sulfADIAZINE, Toprol XL
Non-allergic reactions: aspirin, Latex, Nuts
Canceled/inactive reactions: NKA.

**Past Medical History**
**Past medical history negative**

**Surgical History**
**Surgical history negative**

**Social History**
**Occupation**
**Living arrangements**
Spouse.
**Tobacco exposure**
None.
**Recreational drug use**
None.

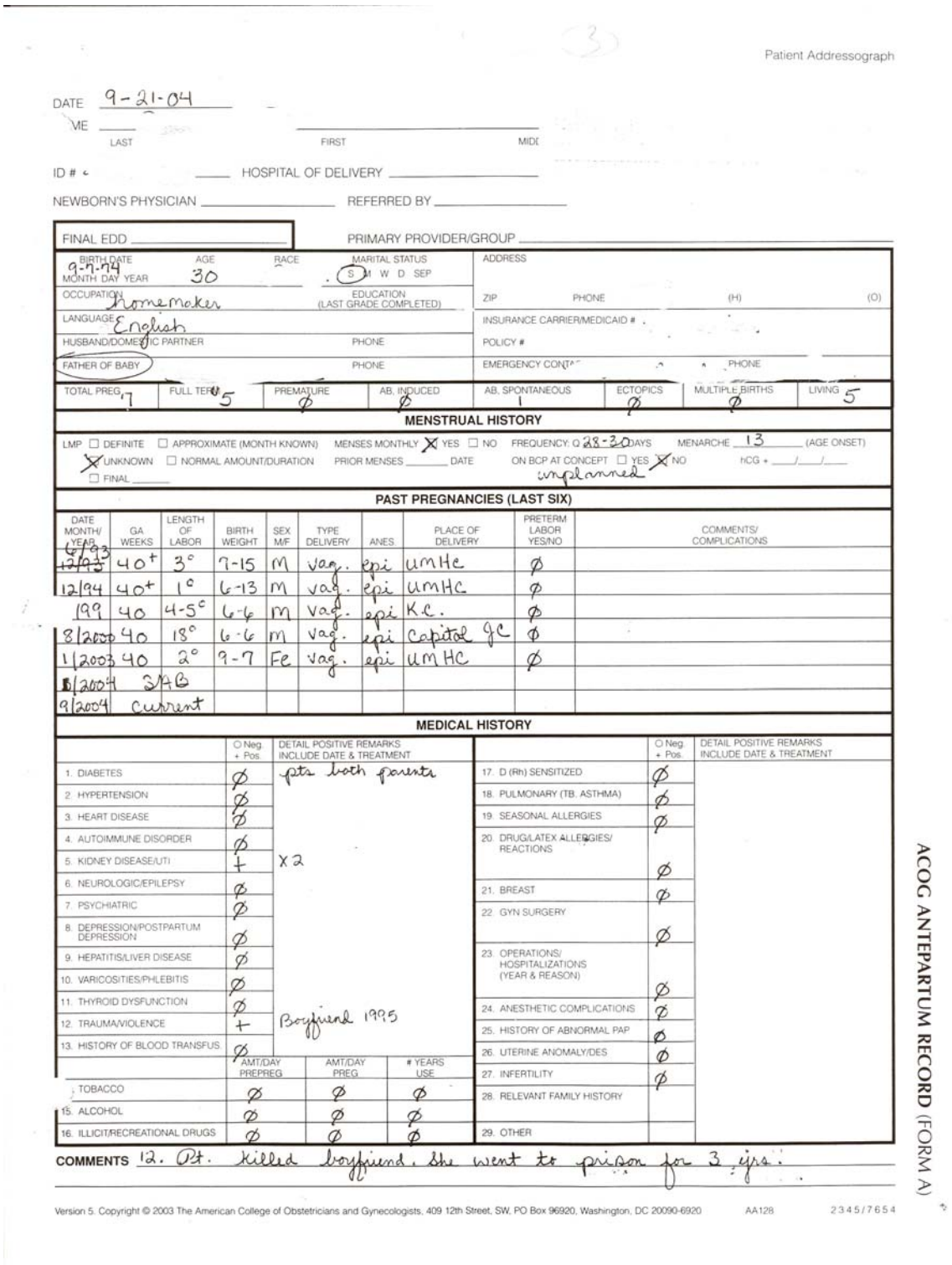
**Family History**
**Cardiovascular Family History**
Abdominal aortic aneurysm: mother.

**Physical Examination**
- **Vital Signs**
- **Constitutional**
  - Appearance: well nourished, in no acute distress, in acute distress.
- **Head/Neck**
  - Supple with full range of motion.
  - Thyroid gland smooth and non-tender: size is normal.
- **Eyes**
  - PERRLA.
- **Ears, Nose, Mouth and Throat**
  - Sinuses nontender.
  - Ears and nose appear normal.
- **Respiratory**
  - Adequate air movement.
  - No retractions noted.
  - No use of accessory muscles.
  - Clear to auscultation.
- **Genitourinary/Pelvic (female)**
  - Normal external genitalia.
  - No abnormal discharge from cervix.
  - No abnormal discharge from urethra.
  - No uterine or adnexal masses palpable.
  - No abnormal discharge from vagina.
  - Cervix nontender.

**Results Review UMHC**
- **General results**
  - Most recent results.

**Impression and Plan**
- **Impression**
  - New problem with work up planned: Premature Labor.
  - Asdfasdfasdasdasfasdasdf.
- **Plan**
  - Total time with patient: 45 minutes.
  - Time counseling/coordinating care: 50 %.

# APPENDIX C – PRENATAL RECORDS



Patient Addressograph

DATE 9-21-04

NAME ____ (LAST) ____ (FIRST) ____ (MIDI

ID # ____ HOSPITAL OF DELIVERY ____

NEWBORN'S PHYSICIAN ____ REFERRED BY ____

FINAL EDD ____ PRIMARY PROVIDER/GROUP ____

| BIRTH DATE (MONTH DAY YEAR) | AGE | RACE | MARITAL STATUS | ADDRESS |
|---|---|---|---|---|
| 9-7-74 | 30 | | (S) M W D SEP | |
| OCCUPATION: homemaker | | | EDUCATION (LAST GRADE COMPLETED) | ZIP PHONE (H) (O) |
| LANGUAGE: English | | | | INSURANCE CARRIER/MEDICAID # |
| HUSBAND/DOMESTIC PARTNER | | | PHONE | POLICY # |
| FATHER OF BABY | | | PHONE | EMERGENCY CONT[illegible] PHONE |

| TOTAL PREG. | FULL TERM | PREMATURE | AB, INDUCED | AB, SPONTANEOUS | ECTOPICS | MULTIPLE BIRTHS | LIVING |
|---|---|---|---|---|---|---|---|
| 7 | 5 | Ø | Ø | 1 | Ø | Ø | 5 |

## MENSTRUAL HISTORY

LMP ☐ DEFINITE ☐ APPROXIMATE (MONTH KNOWN) ☒ UNKNOWN ☐ NORMAL AMOUNT/DURATION ☐ FINAL ____ MENSES MONTHLY ☒ YES ☐ NO PRIOR MENSES ____ DATE FREQUENCY: Q 28-30 DAYS ON BCP AT CONCEPT ☐ YES ☒ NO unplanned MENARCHE 13 (AGE ONSET) hCG + ____/____/____

## PAST PREGNANCIES (LAST SIX)

| DATE MONTH/YEAR | GA WEEKS | LENGTH OF LABOR | BIRTH WEIGHT | SEX M/F | TYPE DELIVERY | ANES | PLACE OF DELIVERY | PRETERM LABOR YES/NO | COMMENTS/ COMPLICATIONS |
|---|---|---|---|---|---|---|---|---|---|
| 6/93 | 40+ | 3° | 7-15 | M | vag. | epi | UMHC | Ø | |
| 12/94 | 40+ | 1° | 6-13 | M | vag. | epi | UMHC | Ø | |
| 199 | 40 | 4-5° | 6-6 | M | vag. | epi | K.C. | Ø | |
| 8/2000 | 40 | 18° | 6-6 | M | vag. | epi | Capitol JC | Ø | |
| 1/2003 | 40 | 2° | 9-7 | Fe | vag. | epi | UMHC | Ø | |
| 6/2004 | SAB | | | | | | | | |
| 9/2004 | current | | | | | | | | |

## MEDICAL HISTORY

| | O Neg. + Pos. | DETAIL POSITIVE REMARKS INCLUDE DATE & TREATMENT |
|---|---|---|
| 1. DIABETES | Ø | pts both parents |
| 2. HYPERTENSION | Ø | |
| 3. HEART DISEASE | Ø | |
| 4. AUTOIMMUNE DISORDER | Ø | |
| 5. KIDNEY DISEASE/UTI | + | X 2 |
| 6. NEUROLOGIC/EPILEPSY | Ø | |
| 7. PSYCHIATRIC | Ø | |
| 8. DEPRESSION/POSTPARTUM DEPRESSION | Ø | |
| 9. HEPATITIS/LIVER DISEASE | Ø | |
| 10. VARICOSITIES/PHLEBITIS | Ø | |
| 11. THYROID DYSFUNCTION | Ø | |
| 12. TRAUMA/VIOLENCE | + | Boyfriend 1995 |
| 13. HISTORY OF BLOOD TRANSFUS. | Ø | |

| | AMT/DAY PREPREG | AMT/DAY PREG | # YEARS USE |
|---|---|---|---|
| 14. TOBACCO | Ø | Ø | Ø |
| 15. ALCOHOL | Ø | Ø | Ø |
| 16. ILLICIT/RECREATIONAL DRUGS | Ø | Ø | Ø |

| | O Neg. + Pos. | DETAIL POSITIVE REMARKS INCLUDE DATE & TREATMENT |
|---|---|---|
| 17. D (Rh) SENSITIZED | Ø | |
| 18. PULMONARY (TB, ASTHMA) | Ø | |
| 19. SEASONAL ALLERGIES | Ø | |
| 20. DRUG/LATEX ALLERGIES/ REACTIONS | Ø | |
| 21. BREAST | Ø | |
| 22. GYN SURGERY | Ø | |
| 23. OPERATIONS/ HOSPITALIZATIONS (YEAR & REASON) | Ø | |
| 24. ANESTHETIC COMPLICATIONS | Ø | |
| 25. HISTORY OF ABNORMAL PAP | Ø | |
| 26. UTERINE ANOMALY/DES | Ø | |
| 27. INFERTILITY | Ø | |
| 28. RELEVANT FAMILY HISTORY | | |
| 29. OTHER | | |

COMMENTS 12. Pt. killed boyfriend. She went to prison for 3 yrs.

ACOG ANTEPARTUM RECORD (FORM A)

# APPENDIX C – PRENATAL RECORDS

Patient Addressograph

| SYMPTOMS SINCE LMP |
|---|
| |
| |
| |
| |
| |

**GENETIC SCREENING/TERATOLOGY COUNSELING**
INCLUDES PATIENT, BABY'S FATHER, OR ANYONE IN EITHER FAMILY WITH:

| | YES | NO | | YES | NO |
|---|---|---|---|---|---|
| 1. PATIENT'S AGE ≥ 35 YEARS AS OF ESTIMATED DATE OF DELIVERY | | Ø | 12. HUNTINGTON'S CHOREA | | Ø |
| 2. THALASSEMIA (ITALIAN, GREEK, MEDITERRANEAN, OR ASIAN BACKGROUND): MCV <80 | | Ø | 13. MENTAL RETARDATION/AUTISM | | Ø |
| 3. NEURAL TUBE DEFECT (MENINGOMYELOCELE, SPINA BIFIDA, OR ANENCEPHALY) | | Ø | IF YES, WAS PERSON TESTED FOR FRAGILE X? | | Ø |
| 4. CONGENITAL HEART DEFECT | | Ø | 14. OTHER INHERITED GENETIC OR CHROMOSOMAL DISORDER | | Ø |
| 5. DOWN SYNDROME | | Ø | 15. MATERNAL METABOLIC DISORDER (EG, TYPE 1 DIABETES, PKU) | + | |
| 6. TAY-SACHS (EG, JEWISH, CAJUN, FRENCH CANADIAN) | | Ø | 16. PATIENT OR BABY'S FATHER HAD A CHILD WITH BIRTH DEFECTS NOT LISTED ABOVE | | Ø |
| 7. CANAVAN DISEASE | | Ø | 17. RECURRENT PREGNANCY LOSS, OR A STILLBIRTH | + | |
| 8. SICKLE CELL DISEASE OR TRAIT (AFRICAN) | | Ø | 18. MEDICATIONS (INCLUDING SUPPLEMENTS, VITAMINS, HERBS OR OTC DRUGS)/ILLICIT/RECREATIONAL DRUGS/ALCOHOL SINCE LAST MENSTRUAL PERIOD | | Ø |
| 9. HEMOPHILIA OR OTHER BLOOD DISORDERS | | Ø | IF YES, AGENT(S) AND STRENGTH/DOSAGE | | |
| 10. MUSCULAR DYSTROPHY | | Ø | 19. ANY OTHER | | |
| 11. CYSTIC FIBROSIS | | Ø | | | |

COMMENTS/COUNSELING 15. both parents of pt. Diabetes 17. SAB

| INFECTION HISTORY | YES | NO | | YES | NO |
|---|---|---|---|---|---|
| 1. LIVE WITH SOMEGNE WITH TB OR EXPOSED TO TB | | Ø | 4. HISTORY OF STD, GONORRHEA, CHLAMYDIA, HPV, SYPHILIS | + | |
| 2. PATIENT OR PARTNER HAS HISTORY OF GENITAL HERPES | | Ø | 5. OTHER (See Comments) | | |
| 3. RASH OR VIRAL ILLNESS SINCE LAST MENSTRUAL PERIOD | | Ø | | | |

COMMENTS 4. Chlamydia 1999, Trich 1999

INTERVIEWER'S SIGNATURE _____

**INITIAL PHYSICAL EXAMINATION**

DATE 9/24/04 HEIGHT 5-7½ BP _____

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. HEENT | X NORMAL | ☐ ABNORMAL | 12. VULVA | X NORMAL | ☐ CONDYLOMA | ☐ LESIONS |
| ~~2. FUNDI~~ | ~~☐ NORMAL~~ | ~~☐ ABNORMAL~~ | 13. VAGINA | X NORMAL | ☐ INFLAMMATION | ☐ DISCHARGE |
| 3. TEETH | X NORMAL | ☐ ABNORMAL | 14. CERVIX | X NORMAL | ☐ INFLAMMATION | ☐ LESIONS |
| 4. THYROID | X NORMAL | ☐ ABNORMAL | 15. UTERUS SIZE | 30 WEEKS | | ☐ FIBROIDS |
| 5. BREASTS | ☐ NORMAL | ☐ ABNORMAL | 16. ADNEXA | X NORMAL | ☐ MASS | |
| 6. LUNGS | X NORMAL | ☐ ABNORMAL | 17. RECTUM | X NORMAL | ☐ ABNORMAL | |
| 7. HEART | X NORMAL | ☐ ABNORMAL | 18. DIAGONAL CONJUGATE | X REACHED | ☐ NO | _____ CM |
| 8. ABDOMEN | X NORMAL | ☐ ABNORMAL | 19. SPINES | X AVERAGE | ☐ PROMINENT | ☐ BLUNT |
| 9. EXTREMITIES | X NORMAL | ☐ ABNORMAL | 20. SACRUM | X CONCAVE | ☐ STRAIGHT | ☐ ANTERIOR |
| 10. SKIN | X NORMAL | ☐ ABNORMAL | 21. SUBPUBIC ARCH | X NORMAL | ☐ WIDE | ☐ NARROW |
| 11. LYMPH NODES | X NORMAL | ☐ ABNORMAL | 22. GYNECOID PELVIC TYPE | ☐ YES | ☐ NO | |

COMMENTS (Number and explain abnormals) discharge present > (+) Clue cells, Ø yeast or trich

EXAM BY _____

ACOG ANTEPARTUM RECORD (FORM B)

APPENDIX D – ONLINE MEDICAL INFROMATION



UpToDate ONLINE 12.3







**Inhibition of preterm labor**

Hyagriv Simhan, MD
Steve Caritis, MD

*UpToDate performs a continuous review of over 330 journals and other resources. Updates are added as important new information is published. The literature review for version 12.3 is current through August 2004; this topic was last changed on September 3, 2004. The next version of UpToDate (13.1) will be released in February 2005.*

**INTRODUCTION** — Treatment of an acute episode of idiopathic preterm labor does not abolish the underlying etiology of preterm labor. Therefore, the goals when treating this condition are to:

- Delay delivery so that corticosteroids can be administered. (See "Antenatal use of corticosteroids in women at risk for preterm delivery").

- Allow safe transport of the mother, if indicated, to a facility that can provide an appropriate level of neonatal care if the patient delivers preterm.

- Prolong pregnancy when there are underlying, self-limited causes of labor, such as pyelonephritis or abdominal surgery, that are unlikely to cause recurrent preterm labor.

The benefits of antenatal glucocorticoid administration include reduction in the risks of neonatal respiratory distress syndrome, intraventricular hemorrhage, necrotizing enterocolitis, and mortality [1]. A benefit of this therapy is initially observed approximately 18 hours after giving the first dose; with maximal benefit occurring 48 hours after the first dose; thus, the primary benefit of treating an acute episode of preterm labor even for a brief period is to allow time for the administration and action of corticosteroids (betamethasone, two doses of 12 mg given intramuscularly 24 hours apart). (See "Antenatal use of corticosteroids in women at risk for preterm delivery").

The treatment of preterm labor will be reviewed here. The pathogenesis and diagnosis of this disorder are discussed separately. (See "Pathogenesis of preterm birth" and see "Prediction of preterm labor and delivery").

**PREREQUISITES FOR LABOR INHIBITING THERAPY** — There are no evidence based guidelines for when to initiate treatment for preterm labor [2], nor universally agreed upon criteria for making this diagnosis. The general prerequisites for beginning labor inhibiting therapy are:

- Presence of preterm labor — This diagnosis is generally based upon clinical criteria of regular painful uterine contractions accompanied by cervical dilation and/or effacement. Suggested specific criteria include persistent uterine contractions (four every 20 minutes or eight every 60 minutes) with documented cervical change or cervical effacement of at least 80 percent, or cervical dilatation greater than 1 cm [3].

Identifying women with preterm contractions who will deliver preterm is an inexact process. In one