

**Improving Data Flow for Better EMR Quality at KAMC**  
Activation of the Electronic Code Unit System (ECUS) in EMR

By

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Dear, Dr.Raza Abidi,

This letter certifies that Rasha Alyamani (master of health informatics student – MHI at Dalhousie University, Halifax. Canada) has done her Master internship in I.T department at King Abdullah Medical City in Makkah, Saudi Arabia. She was working with hospital staff to improve our system in medical records department and code unit, observe hospital processes map workflow, improve current system in various departments. Rasha has selected an issue for her project by exploring all the issues in our system. Her Project Title is activation of the code unit system in EMR at KAMC. She needed to collect all information and data by attending many meetings and using some research methods to reach the appropriate solution. During the project period, she worked at the I.T department's location. The length of the project is 13 weeks from 12-1-2013 to 12-4 -2013 (winter term).

Mrs. Alyamani has been very professional intern has the skills and the aptitude to be a valuable member of the IT team. She seems truly enjoyed all aspects of her internship and it has been pleasant experience.

If you have any questions, please contact me.

Best Wishes.

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## Acknowledgements and Endorsement

This report has been written by me and has not received any previous academic credit at this or any other institution.

Without the encouragement and dedication of my family, university staff and professors, I would not have had all I need to produce my internship work. Therefore, I would love to offer my greatest thanks to my beloved family who encouraged me and motivated my efforts throughout the period I dedicated for this report. Also, I have to offer my sincere thanks to my university staff that provided me with the necessary resources and information that guided me through my internship: my internship supervisor Dr. Raza Abidi, my workplace supervisor Mr. Mazen Aljizani, my previous internship supervisor Dr. Michael Graven who helped me get the acceptance from KAMC to conduct my internship. Last but not least, I offer my sincere thanks to all KAMC employees especially Ms. Ahlam Husawi who works in the code unit department and Duaa Sharbini, Thamer Bakheshwain, and Hanin Sirhan who work in the IT department. My sincere thanks to those who dedicated a portion of their valuable time to guide and help me conduct this report.

Rasha Alyamani

## Executive Summary:

This internship explains the process of introducing a new system called Electronic Code Unit System (ECUS) into Electronic Medical Record (EMR) at King Abdullah Medical City (KAMC). The purposes of introducing this system were to improve health and patient outcomes, increase effectiveness and efficiency of the recording system, and promote quality of care.

Health informatics faces a variety of challenges and difficulties searching to offer better service for patients and health service providers. Health informatics is considered with the use of information communication technologies and procedures within the healthcare systems, especially hospitals. Many challenges are faced as the developers of the information systems and electronic records within the healthcare systems consider the information needs of all involved healthcare providers. Handling health information accurately can be a tedious task and some ethical issues should be considered as well (Bath, 2013).

One of the most important subject or factors that health informatics should consider and focus on is the electronic medical record of the patient which is represented by EMR. This record is responsible and accountable for ensuring the transfer and movement of information from one department or user to another without any errors, discrepancies or problems. Many methods can be adopted in order to ensure the best use of EMR. The most important would be the availability of a harmonized and standardized code system around the globe.

The medical coding system has great benefits for the hospital, as well as the health service providers. The medical coding system is important to enable effective communication inside the hospital and among the different departments. The coding is not only important for medical purposes, but rather for

commercial use, Commercial companies such as insurance companies, Medicare, and other companies use these codes to handle a payment (Hicks).

The author has worked as a provider for health informatics in the IT department to work as a connection between those working in the IT and the health providers. Responsibilities include developing the MPS, which is the main system that is used in the hospital and which is used in the Electronic medical Recode (EMR) in King Abdullah Medical City (KAMC).

The project is about activating and utilizing the Code Unit system within the patients' EMR. The report has gone beyond that and it has included a general evaluation for the previous, and the old version of the code unit system, pinpointing the problems and the inefficiencies that this system suffers from. As a result, recommendations and suggestions were to be presented to address the problems of the older code unit system.

The internship was conducted based on some experience, networking and knowledge accumulated during the studying period in the Master Health Informatics besides the experience and knowledge collected and accumulated from a variety of individual and group projects and reports done during the studying courses. Overall, the period of the internship was very fruitful and important, as it allowed the writer to apply a variety of theoretical concepts and theories, while gaining a practical experience in the field. The internship has paved the road towards success in the real life application of lessons and theories studied in the classroom.

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**List of Acronyms:**

<b>Acronym</b>	<b>Meaning</b>
<b>ECUS</b>	Electronic Code Unit System
<b>EMR</b>	Electronic Medical Records
<b>ICD 10</b>	The revision of International Statistical Classification of Diseases and Related Health Problems
<b>ITD</b>	Information Technology Department
<b>KAMC</b>	King Abdullah Medical City
<b>MPD</b>	Medical Records Department
<b>MPS</b>	MedicaPlus System

## **1.Introduction:**

Health informatics is a technical social science based on sophisticated information and communication technology and characterized by its research on how best to collect, store and retrieve, analyze and manage information in various health fields. Furthermore, health informatics uses the latest methods of information technology that is based on medical and administrative, applicable and advanced grounds to provide the correct information at the right time and to the right person to find appropriate solutions. This will allow them to make the right decisions simultaneously with providing superior quality services to improve health services to the community, and thus save the time, effort, and money.

In order to achieve the goals of Health Informatics and achieve the best results, the focus is on the design and development of many systems and standards; and the most important of that is EMR, which aims to unify the main coding system for the patients' health file, regardless of the provider of the service. In addition, another concentration would be on standardizing the medical coding system in patients' health files, and decreasing duplication of data entries, regardless of the location of the storage of such data. Another goal would be the harmonization of standards and procedures used in dealing with the medical records, the design and implementation of an electronic system that is characterized by high safety and reliability features, besides ensuring the confidentiality and secrecy of when one moves and transmits data. A specific strategy will be used to connect and exchange information between different systems and standards that are consolidated to ensure the security and confidentiality of information exchanged it will offer the necessary control on their contents and presentation ways. This has a variety of the effects and benefits such as: helping to raise the quality of health services and reduce costs in general, reduce errors in files and medical documents, contribute to the reduction of paper work, contribute to the provision of health care based on updated and timely information, provide personal health care for patients through the availability of all the information from all facilities participating, raise the level of quality expected in the



provision of health services, improve the ability to detect early disease and injuries, and improve the ability to monitor and manage diseases and the services provided to patients.

## **2. Description of the organization:**

As a result of the Decree order no. 3064, The King Abdullah Medical City was established to be one of the most capable health services institutions in the Saudi Arabia. It has the capacity of 1500 beds, 500 of these beds are just dedicated for the special medical cases. Also, the KAMC's services cover all the rare medical specializations (King Abdulla). It has been established after a long period of deep research and studies about the medical needs of the local residents of Makkah City. The KAMC was established to offer residents medical services of higher standards. The KAMC is a giant medical center that is located on an area of 800,000 square meters. KAMC offers a variety of medical services that include, but are not limited to: chemotherapy, breast and endocrine surgery, retinal survey, chest and mammography, paediatric oncology, intensive care, neuro ophthalmology, endocrinology, haematology, etc. (About KAMC, 2013).

KAMC aims to offer specialist services to the patients that need these services. KAMC is home to various qualified local as well as international medical specialists. The hospitals are subdivided into several departments. These departments include the neuroscience center, specialized endoscopy center, eye surgery center, department of specialist surgery, oncology department, and open heart surgery department (Nursing Agency, 2012). The oncology department offers outstanding services to cancer patients, as these patients require continuous services and care. This center is divided into the adult chemotherapy and oncology treatments. The heart treatment center offers a variety of medical services and surgeries. All specialists working in these departments have undergone the necessary training and obtained the necessary qualifications from North America and Europe (KAMC, 2012). All these departments are under the

medical and clinical management, plus more departments in the administrative and financial management are shown in Figure 1: KAMC Organizational Chart from KAMC Website.

Three information systems are used in KAMC to active its tasks which are: Health Information System (HIS) which is MPS which is provided by Heath Insights Company, Picture Archiving and Communication System PACS which is provided by Agfa and Radiology Information System (RIS). In order to link the three systems, KAMC is using HL7 messaging with the eTX Healthcare Enterprise Messaging and Integration Engine (HEMI).

MPS is considered to be one of the most important systems used in the KAMC. This software application contains more than 500 special modules that are classified and categorized into a variety of configurations depending on the needs and the requirements of each hospital. It occupies the first point-of-care where the patient records are managed and allocated according to the health service provider specialty such as Cardiovascular, Chest, Abdomen, etc. The system creates automation at point of care and it provides a kind of intensive and integrated management for the general medical and patient records. The system encompasses several types of databases that focus on medical specialties and states of disorder. Through this information system, hospitals have the ability to automate patient information and thus, deliver more efficient and effective health care services. It is a revolutionary system where several applications work together harmoniously. The operations of this system are based on three different functions. The first function is represented by the User interfaces. The other two functions are access services MPS as well as the business services.

MPS is developed by Health Insights. This firm has been successful in providing a variety of solutions to the medical industries. The firm, through its integrated software applications, facilitates better clinical decision making. The firm has enabled physicians and other workers in the medical industry to have automatic access to important information (Health Insights, 2013). In addition, Health Insights

Company has signed a five year contract with the hospital to send its employees to work at KAMC in order to solve MPS problems.

The medical record is a very useful module in MPS that allows doctors to track the patients' old medical history and identify problems that help in their treatment. It also assists in determining the course of health care. Medical Coding on the other hand, is the procedure of examining patient medical records and allotting codes to diagnoses and procedure for patients. Both medical records and codes serve a wide range of crucial tasks in a hospital.

Medical records tell a physician everything they need to know about a patient before diagnosis or starting any medical procedures. It helps in billing the patients, provides evidence of care for legal purposes, quality of care and more. In addition, it helps in refining the usage of resources, improving proficiency and coordination among doctors, staff and research facilities. Medical codes, as described earlier, re distinct numeric value assigned to each and every diagnosis, medical procedure, symptoms of a disease, outcomes of drugs, complications of surgery, and so on. The common uses of medical codes in hospitals are identifying signs and symptoms that must be assessed and alert doctors and other healthcare professionals, such as: nurses about serious allergies, reporting medical services done for reimbursement in the end, assisting with organizational functions like recruitment, scheduling and implementing new healthcare services. Therefore, they are used in several different ways to facilitate medical procedures, diagnoses and discharge summaries in hospitals ('Medical records', 2012).

During the internship, the author was working at two department of KAMC which were Information Technology Department and Medical Record Department. The organizational charts of these two departments are shown in Appendix, Figure 2 and 3.

## 2.1. Information Technology Department (IT):

Day-by-day technology is changing the way things used to work, and like every other field, the medical field has also improved with the advent of Information Technology. It has provided numerous benefits to patients and healthcare providers. Information technology impacts a wide range of areas in medical industry such as the manner in which patient information is stored, high end machines for diagnosis, creation of robots to perform surgeries and so on.

Although there are various areas in medical field where information technology caused evolution, but we can divide it into following sections:

- Electronic Patient Information – Information technology has changed the way in which patient data is saved and used within hospitals. Due to electronic data storage there is no need to keep hard copies of patient records and it is so much convenient to look at patient history, insurance & account information and immunization records.
- Medical Equipment – It also helps in improving test performance, better diagnoses and more accuracy and precision while performing surgeries.
- Disease Archives – Canada owns disease archives that store information related to diseases that affect large population. These registries help researchers to carry they research more precisely; create regular reports and present analyses.
- Quality Management – There is always scope for improvement especially in health care industry. Therefore quality management is an important part of it. Information technology helps medical industry to expand its quality management efforts. Hospital and other health care facilities can create computer software to perform quality assurance automatically on a regular basis and then make reports based on the discoveries.

- Health Insurance Information Exchange – Information technology can share health insurance information between health insurance companies. This would eliminate the need for patients to serve as middlemen between health care providers and their insurance companies (Sheahan, n.d.).

## **2.2. Medical Record Department (MRD):**

Another important department related to the author's internship is MRD.

After obtaining consent from the Registration office, MRD staff opens a patient file. The main job of night shift employees is to collect appointment list and to collect all medical records from previous day and then to arrange those appointments by name of the required clinic or physician. Once it has been prepared, the morning porter will distribute the appointment list to the clinics and then recollect the medical record files from clinics every.

About the discharge of patients, it's the job of the MRD technician to prepare the list of discharge patients from the previous day. Once all the files have been collected by the porter from each block, they have been carefully examined by the MRD technician in the assembly area. After checking the file if there are no mistakes and all documents are for the same patient then that file is transferred to code unit but if there is any mistake in the discharge file, the MRD technician uses MPS in order to recognise the mistakes and then he notifies the responsible clinic or physician about the mistakes. It might take more than 10 days to get the file back from physician depending upon the workload of that physician. Once the files have been clearly marked and have been re-checked by the MRD technician, they are sent to the code unit. The code unit plays a major role MRD and communicating the patient records and information across the departments of the hospitals. The code unit plays the fundamental role in transferring the patient records and medical codes without error. KAMC, as any other governmental hospital, belonging to the ministry of health, uses the same type of codes used by the ministry which is the ICD10 AM and this is the same code used in Australia. The code unit, through the medical codes, makes the communication among health

service providers easier. It enables better understanding of medical records and standardized interaction within the hospital departments (Hicks). During the coding process, the coders receive all the discharged patients' files within a day or two. After getting all the files the coders code all the files using the 3M coder finder and the ICD 10 AM. After the coding has been done, porter files all the medical record in the filing area. Coders in code unit are also doing some statistical activities then send the file to the deficiency area which is a part of the filling are to check the E-sign the file will go to the shelving areas. In case there is additional procedures happened during operations, the physician will record them from his office or even from his home through software. these voice records send to the company translation office in another country which is Egypt and that take from five to ten days to be done then the staff in deficiency send it to the physician for the review and E-sing it. Finally, the file sends to the shelving areas.

### **3. Description of the internship:**

#### **3.1. Problem status:**

At KAMC, there is a policy that forbids any modifications or additions to the data and file of the patients after leaving the hospital. This policy will render the coding in the code unit difficult to do and futile. As per the policies of the hospital, employees are not allowed to insert codes inside the electronic file of the patient, and as a result, they insert the codes in a different file and separate from the patient's EMR. The codes are inserted in an ICD 10 AM Excel sheet. These files are saved in the computer systems of the coders responsible for the codes and they are two coders, Ms. Ahlam Hosawi, and Ahlam Sindi. All codes related to the unit code will remain in two different computer systems in the hospital. The coders make a backup copy of the information and save it in and external USB data storages. This business processes is shown in Figure 4.

However, these procedures are not efficient as they result in numerous problems obtained below:

- The coder working in the code-Unit has to fill an ICD 10 AM Excel sheet and record information manually, creating a table containing the patient ID, date of hospital admission, and the discharge date. She was recording the appropriate code for the disease after making sure that the discharge summary submitted by the doctor responsible about the case besides the need to conduct a general and rapid check up on the whole file and all conducted to the patient such as X-rays, analyzes and surgeries(see Appendix, Figure 6). This process will take a lot of time because it involves manual procedures that will require searching for and retrieving important data such as the patient number, date of Admission and discharge from the hospital.

For example, let us consider that the procedure is abortion and its code is (O06) and its type is spontaneous abortion (O03) then the subcategory (O03-O06), and so on. Also, coders put specific codes for the patient associate conditions and complications and then more codes are added for other medical procedures conducted using the same method. Because the ICD 10 AM Excel sheet file is not connected to the EMR in the system and thus, those medical codes are not considered. The coders have to start conducting a manual search of all the data. For instance, the coder has to search for the name of a disease such as measles among the diseases on a long list in the ICD10 AM eBook (see Appendix, Figure 7). Then, they have to choose the code and insert it manually through typing.

- The availability of the codes in the ICD 10 indexing sheet makes it difficult for users to retrieve and use it because it is saved only in the computers used in the code unit, and as a result, this will render this data useless when considering the electronic EMR of the patients. Also, this will make the data useless for other users such as pharmacists and accountants.
- Considering that we cannot conduct electronic statistics for the diseases using code number, the coders in the code-Unit conduct these statistics manually and this is done in an ICD 10 AM Excel

sheet. The latest statistics were to place each patient into two different classifications of code statistics. The first was by the disease diagnosis where the coder types the date of admission and discharge, the main code and the peripheral codes that represent the other diseases that are related to the main disease. For instance, the cancer patient could have a variety of other diseases such as diabetes, and other diseases besides the codes of the analysis and the medical procedures conducted such as X-rays. This took through collecting all information from the USB storage devices maintained by the two coders responsible for placing the codes in the code unit then copying and pasting these codes in a one file which is the ICD 10 AM Excel sheet. As for the second classification, it was by the discharge data and here the coders input the number of the patient and the original code that describes the main disease. To retrieve more information, the coders usually referred back to the first classification that classifies diseases according to the medical codes and these results in a waste of time. At the end of these statistical activities, the coders mad a summary of coding and indexing report for each month (see Appendix , Figure 8).

- Recording the codes in an ICD 10 AM Excel sheet for each individual day or inside a monthly statistical coding and indexing reports make the data and information erroneous or subject to error. The coder enters the data manually while she is looking for the appropriate code for the appropriate disease. All is written or inserted manually from a variety of choices. This process is subject to error and this will have a direct impact on the accuracy of the information and thus, the health of the patients because they are treated according to this data and information. Furthermore, they are followed up in other hospital in case they decide to transfer, according to this information.
- The process or method used to record the codes in (ICD 10 AM Excel sheet) or (coding and indexing reports) enables us to find the final diagnosis of the disease, but it remains difficult to search for symptoms associated with the disease or procedures that have been followed for the diagnosis or treatment of the patient and here the codes will lose its importance and become



just futile, where the main objective of the coding is for the standardization of medical terminology related to diagnoses or procedures or other medical terminology as treatments and disease names until they become global. Also, we will not be able to identify the rates of diseases and symptoms electronically that are important to perform calculations and statistics.

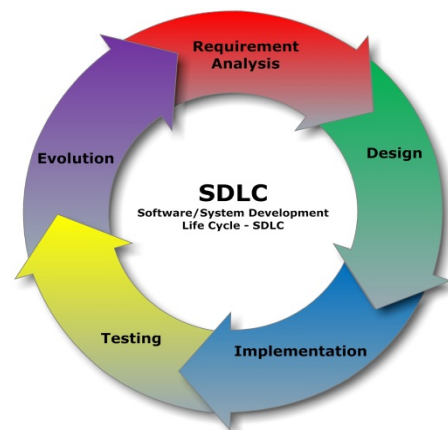
### 3.2. Description of the work performed at the organization during internship:

The internship work which was performed at (KAMC) can be described as the following:

#### 3.2.1. Project Life Cycle:

The methodology that has been used to demonstrate the electronic code unit system (ECUS) is Systems Development Life Cycle (SDLC) methodology. This methodology consists of five primary phases which ordered sequentially. Also it is iterative, so a new cycle cannot begin unless all phases have been completed.

- Requirement Analysis.
- Design.
- Implementation.
- Testing.
- Evaluation\Evolution (Wikipedia, 2013).



ECUS cannot work alone; it should couple with other modules such as Medical record module and the EMR system. So it have to be taken into consideration in the modules life cycle(Kammani and Others, 2013).However, the SDLC methodology is showing clearly in the table of the author roles.

### 3.3. Roles of the author in detail:

Weeks	Date	Roles
<b>Week 1</b>	January 12-16	<ul style="list-style-type: none"> <li>- Identify requirements and obligations to be a trainee, sign working papers, get employee identity card, and obtain medical file in KAMC.</li> <li>- Get an office and computer specified for trainee, obtain an authorization number to access Internet and MPS domain.</li> </ul>
<b>Week 2</b>	January 19-23	<ul style="list-style-type: none"> <li>-Meet head departments of IT &amp; MRD to discuss the importance of health informatics, explain what the internship student can offer to KAMC, in addition to presenting many projects performed by the author during master studying period.</li> <li>-Discuss problems and challenges face these departments in the last period and suggest solutions.</li> <li>-get permission to work in all departments of KAMC in order to obtain most employees support to the project which will be chosen later on.</li> </ul>
<b>Week 3</b>	January 26-30	<ul style="list-style-type: none"> <li>- Identify and understand KAMC organizational culture, vision mission, philosophy, goals, and objectives.</li> <li>- Recognize the medical data utilized in KAMC.</li> <li>- Realize how information flows within KAMC.</li> <li>- Search on literature about medical record and coding systems utilized in KSA and in developed countries.</li> </ul>
<b>Week 4</b>	February 2-6	<ul style="list-style-type: none"> <li>-Analysis KAMC policies and procedures regarding medical record and EMR.</li> <li>-Further search on literature about medical record systems among the world.</li> <li>-Make SWOT analysis to the organization to get clear understanding of its ability to demonstrate the project.</li> </ul>
<b>Week 5</b>	February 9-13	<ul style="list-style-type: none"> <li>-Focus on specific problem in the code unit to be a project.</li> <li>-Make Critical analysis to recognize the previous system characteristics, advantages and disadvantages.</li> <li>-Choose the project name “Improving Data Flow for Better EMR Quality at KAMC(Activation of the Electronic Code Unit System ECUS in EMR)</li> </ul>

<b>Week 6</b>	February 16-20	<ul style="list-style-type: none"> <li>- Suggest solutions to the code unit problem, lead meetings to discuss the possibility of demonstration the proposed solutions.</li> <li>- Obtain agreement of the most employees regarding the most appropriate solution which is making exception for the Coders to open EMR of the patient after discharge from the hospital to add medical codes.</li> <li>-Make a proposal to compare between the old and new system using DFD Diagram.</li> </ul>
<b>Week 7</b>	February 23-27	-Make presentation for the proposal and obtain support of IT and code-Unit department to communicate the hospital to apply the new system.
<b>Week 8</b>	March 2-6	<ul style="list-style-type: none"> <li>- Meet the company which provide the system to explain the problem and its proposed solution.</li> <li>- Provide the hospital management permission to the company to apply the new system and the list of employee names that are authorized to use the system.</li> </ul>
<b>Week 9</b>	March 9-13	-Activate ECUS system and start its working at code unit.
<b>Week10</b>	March 16-20	<ul style="list-style-type: none"> <li>-Observe the workflow with the new system; observe time and efforts consumed by coders with the new system in comparing with the old ones.</li> <li>-Prepare report for IT &amp; MRD to describe the characteristics of the new system.</li> </ul>
<b>Week 11 &amp; Week 12</b>	March 23-27 March 30-April 3	<ul style="list-style-type: none"> <li>- Evaluate the system in participation with the coders.</li> <li>-Suggest recommendations to improve the efficiency of the System and provide the evaluation outcomes to the management of the hospital.</li> </ul>
<b>Week 13</b>	April 6-10	-Obtain recommendations of the supervisor at work and collect some pictures and information necessary to prepare internship report.

### 3.4. Project Objectives:

The underlying cause of the above mentioned problems are not the lack of information system but the underutilization of existing information system by the hospital staff. The current hospital policies, information flow among the various departments and the business process of the hospital must be reviewed in order to solve this problem and only then can the current information system of hospital be effectively used. A new kind of system known as Electronic Code Unit System or ESUS is used to update all patients' medical records and also to overcome the problems related to medical coding. The main objectives of this system are for

- Increasing health care quality by:
  1. Decreasing the data redundancy in the system by using EMR as the single source of information rather than having many different files such as ICD 10 AM Excel sheet prepared by the technicians.
  2. Helping the medical care providers to have access to the meaningful medical codes so that they can provide better and accurate health care to the patients.
- Save time by:
  1. Decreasing the time used to do the manual searching and typing done by the coding technician.
  2. Decreasing the time frame to access the procedure codes which will allow for rapid decision making and better diagnosis and treatment for the patients.
- Save money by:
  1. Decreasing the use of USP data storage and other storage equipment.
  2. Decreasing person-hours lost to administrative tasks.

### **3.5. Relationship to KAMC Strategic Plan:**

The changes that have been proposed in this report are not in accordance with the directions and objectives of KAMC where the hospital policy permits only the care providers to view the EMR of patients. The health care providers were not permitted to modify or add anything to those codes after patient discharge and KAMC did not have any exceptions. So the author conducted a meeting with the hospital management and she was able to convince the hospital management to give authorization to the coders to do the additions in the EMR after the patient had been discharge and to close the patient files.

The implementation of Electronic Code System Unit (ECUS) is in accordance with the goals of KAMC to have a fully electronic code system unit that will provide information to the medical care providers in real time. Also it will allow the care givers to access that information from any place and can be transferred from one place to another very easily.

### **3.6. The Proposed Solutions:**

To resolve the problem faced by the code-Unit; the author proposed two solutions then excluded one of them which is the first and applied the second. These solutions were

#### **3.6.1. The Excluded Solution:**

Buying a special coding system which allows the coders to enter codes without opening the EMR. The disadvantage of this solution is the high cost that you KAMC will need to buy system and interface engine to connect the new system with MPS.

#### **3.6.2. The Applied Solution:**

Staying at the same policy of the hospital which does not allow opening the patient's EMR, but an exception is given for two code unit employees who become responsible for opening the medical Record Module and enter codes after patient discharge from KAMC while keeping the rest of the file for view only. Since this option is available in MPS, the author obtained the approval of the IT department and code unit to support the project. Also the author communicated with the management of KAMC to modify its policies regarding EMR. Moreover, a request was sent to the company section which offers this system at the KAMC to obtain a permission in order to demonstrate this suggestion.

The main motive of this ECUS system was to provide more benefits to the health care providers, so its design needs to be simple and it should be able to re-use the existing infrastructure as much as possible. ECUS has also been able to work with minimum supervision so that not all KAMC employees are required to operate it.

Keeping the above mentioned criteria in mind, the solution has been designed with the use of the three existing systems and does not require any additional information source, middleware or data system.

Many modules used in EMR including ECUS can be accessed by the authorized users using MedicaPlas System (MPS). The solution that has been proposed is not intended to replace the existing system but to increase the efficiency of the existing system and to provide access to EMR for all the health care providers so that they can directly complete the procedures codes.

On the other hand, the solution that has been proposed makes a big difference in the code unit work process. In the ECUS, the coders receive the discharged patients' files from the filling area. They check the discharge summary and a quick look on the entire file. The coders go to medical records module on MPS and open the admission and discharge form (see Appendix, figure 9). They fill the codes part by choosing the appropriate diagnoses and procedures codes from the list of ICD 10 AM codes so they do not need to write the codes. In the end, the coders save the changes on the form and sign out of the system. This business processes is shown in Figure 5.

### **3.7. Limitations:**

The most important challenges that faced the author were

- Time consuming; the period of time specified for the project made taking of approvals difficult because the process consumed a lot of time; on the other hand, persuasion of KAMC management on the importance of giving the coders permission to add codes after patient discharge needed time.
- Lack of cooperation of Health Insight Company's staff which offers the system of MPS with IT department in KAMC that they refuse any modification or addition from IT employees and ask them to refer any problem related to their system to their staff; also they do not explain their ways of solving problems. This made the role of the author difficult that she could not get clear information about the technique of implementing the proposed solutions by her to activate the ECUS in the patients' EMR. However, they clarified that the system can give approvals to certain

departments or staff to modify Editing, deletion or adding of information in any Module in the system.

#### **4. Internship and health informatics:**

The success of a health informatician lies in the category of majorly four skills. Being an analytical person leads one to a different perspective and standard. One gets to see the oblivious side of things and tries to collect more information so the analytical thinking can function more efficiently. Similarly in a hospital or physician office or any health organization, health informatician needs to have the skill of being analytical. Health informatics is not a field to compromise with as it has a direct effect on human life. A skilled analytical health informatician is one who can understand and assess the systems and their functions, whereas is also able to improve the present scenario of a system and identify the future information needed.

The second major key for being a successful health informatician is to know how to deal with technical skills, as they are technical they are meant to be confused and complex. Thus to be able to be accurate with the information systems and technology it is essential for a health informatacian to be aware of all the technicality of the management of the information. How to conduct a project, what will be the risks and how can one handle those risks and how to allocate resources all these are a one minute game for someone who does not lack the quality of management. Hence a health informatacian to bring forward good outcomes and better performance in organization will always be managed and good at ending what he/she starts working on.

Management skills include being good at initializing and executing a project, and in a health informatics job or internship management also includes to know how to operate with computers and manage the information in an order. Health informatics is a field dealing with health science and computer

science related to healthcare. And no one wants to have a staff of people who even lack the full knowledge of the field they have opted to be in, especially when it comes to healthcare.

Interpersonal skills also play a vital role in working as a health informatician. Interpersonal skills help the author to improve the final outcome and performance between the different asset holders who are directly affected by any change in the health information industry or particular organization. The Master of Health Informatics courses at Dalhousie University were very helpful courses and have provided the author with all the useful skills to do her internship.

There are various courses of health informatics; they all are beneficial to the health informatician as they all enhance the knowledge more. The course of “Health Information Flow and Standards” gave the author the ability to use different kinds of diagrams such as the Business Process Modeling (BPM) in order to see the differences between the old and new system workflow.

Another helpful course is “Information Systems and Issues”. It helped the author to focus on the issues related to the old code unit system and gave her the ability to build the solution, and to deal with the critical and technical issues in the ECUS project.

“IT Project Management” not only helped the author in dealing and managing the author's project but also played a role of an interactive period with the stakeholders of the project during the internship.

The author skills, which were obtained from the course of “Research Methods”, helped her to do the critical analysis of a specific problem and its solution. This course was helpful in the period of evaluating the ECUS in order to ensure that the project will have positive effects on the organization in the future. It helped the author to design the evaluation as she identified the required method and design which were suitable for ECUS evaluation.



## **5. Critical Analysis of One Work Problem:**

### **5.1. The problem:**

During the internship, the author had to conduct a variety of tasks in order to get the best benefits from the project conducted. One important task of those was to provide the author with the necessary evidences to prove the success of the project for the organization in order to ensure that continuous updates will take place and the organization will review its policies that could have contractions with the interests of the employees and the general stakeholders. After following all the steps of the project, the author had to choose a problem and make a close study through critical thinking in order to address this problem. the problem is the modifying the policies of the hospital especially those related to the rules that regulate the use of the electronic system.

#### **5.1.1. Critical Analysis of the Problem:**

Despite the fact that the organization is still young and not mature as it is not more than 3 years old, the management is not willing to change any of its polices. The organization does not see any update is necessary and it see the current situation as satisfactory. It does not neither consider the technological developments that took place nor the additions that were added and invented in order to offer better medical services. The reasons of that could be related to a variety of social as well educational and other reasons.

The electronic information system is one of the most important modern technological developments and systems adopted by the medical organizations and this system continuous updates and changes. This is a general system used by the health care providers and all related stakeholders. Adopting the idea of a general electronic information system enabled KAMC, sometimes to replace many of the traditional services. The hospital started relying on such systems for booking and other services that facilitate the work of the employees and patients. Under a variety of circumstances and applications, the

hospital has combined between this modern information system and the traditional applications and procedures. For instance, in addition to the paper-based medical record for the patient, a new electronic medical record has been created but this kind of record requires different process and steps than those applied in the paper-based patient record. However, due to the fact that the systems applied in the hospital does not consider or accommodate these differences; a variety of challenges and barriers will arise and will minimize the benefits expected from the current electronic information systems. This situation as well, will face many other problems such as the problem of entering the medical codes inside the patient medical file and this is a major problem challenged by the code unit.

The success of the new code unit system, which the author has conducted throughout the internship period, could be considered a gate for a variety of positive changes and updates in the main system of the hospital besides the changes and updates addressing the problems related to the electronic medical record specifically besides those problems that are mostly related to the polices and systems of the hospital and that need a managerial decisions to enable modifying its laws and regulations when needed.

## **5.2. The Solution:**

The author has conducted an evaluation to ECUS and this has provided primary results concentrated at most on measuring the satisfaction of the users through measuring the features and the functionality of the new system as well as its ease of use. These are the tasks that were accomplished by the author during the period of the internship. After this, the author has provided suggestions in order to conduct a long-term evaluation based on the numbers and statistics in order to offer better measurements for the financial and clinical results of the system. For this, the author has made sure that the management of the hospital got a copy of this evaluation especially the portion that is directly related to the evaluation in order to ensure that the hospital gets the best benefits of the report and evaluation conducted.

### **5.2.1. The purpose behind the evaluation:**

The success of ECUS will not take place unless the management of the hospital agrees to conduct the necessary changes in the policies especially those related to closing the medical record of the patient after his/her discharge from KAMC. Besides, policies have to be changed in order to give the coders in the code unit the authority to enter the medical codes after the patient discharge and the closure of the related medical records. This will make the system an ideal reality of great benefits to the management that will recognize the importance of reconsidering and modifying its view in relation to its policies. In order to achieve all of this, the solution was to conduct a practical evaluation for the new system through offering real scientific and tactile evidences.

Another aim of this evaluation is to ensure whether the ECUS has accomplished the stated goals which were

- To access the diagnosis and the procedures codes in the EMR.
- To promote time efficiency.
- To improve clinical outcome by eliminating manual searching and writing errors.
- To improve code unit cost effectiveness.

#### **5.2.2. Participants of evaluation:**

The author has applied an evaluation during the term of the internship. Several individuals have participated and shared roles in the evaluation. These individuals included the system designer who is the author, the IT expert who worked as a witness and monitored the success of the project. In addition, the IT expert has assumed the role of transmitting the image of the success of the project to the management of the hospital. The reasons behind giving this role to the IT expert would be allowing the hospital management to verify the success of the project by one individual of the staff inside the hospital in order to ensure the reliability and the credibility of the evidence. Other individuals included coders who benefit from the implementation of the system as well within the KAMC environment.

The author was proposed to the hospital management to do another evaluation of ECUS and this is usually conducted by the Department of Scientific and Research. The hospital should conduct its evaluation for the largest one and this will included all the stakeholders and the users of the system of health care providers inside as well outside the organization and the patients.

### **5.3. Criteria for Success:**

Three criteria were used during the evaluation during the internship period. These criteria were used to prove the success of the project conducted and they are usability, functionality and administrative outcome.

#### **5.3.1. Usability and Functionality:**

The usability can be defined as the ease of use and through which the functionality would be accessed like a more abstract concept. The ease of use is determined by the manner in which the user will communicate with a system. As for functionality, it is related to the features of the system and how effectively and efficiently the system operates in related to the individual tasks involved. For instance, the functionally can answer the questions, what functions are provided and how the functions are implemented?

To ensure the usability and functionality of ECUS, the following expected outcome must be met after application of the new system.

- The coders must be able to access all information easily without errors.
- The coders must be able to access information with less time.
- The administrative costs of code unit must be decreased.
- The coders will not perform manual statistics activities.
- The incidence of medical errors must be decrease according to quality management reports.

### 5.3.2. Administrative Outcomes:

The administrative outcomes tend to show clearly and effectively how the benefits of the new system through measuring the effect of the ECUS on administrative costs. However, we have to note that the critical results and outcomes are measured through evaluating the safety and the care of the patients.

- There is a decreased as well in the number of the toner cartridges used.
- There is a decrease in the number of pages printed on the unit printer and the use of the USB data storage.
- There is a decrease in the number of the toner cartridges used.
- Taking into consideration both the material as well as the personnel costs, the ROI ratio was positive.

A long-term clinical outcome study should be conducted in the suggested evaluation for the hospital management. The evaluation is done by the Department of Scientific and Research. The clinical outcome evaluation will show the benefits of the project from a medical perspective.

### 5.3.3. Clinical Outcomes:

In order to determine the efficacy of the ECUS, the patients clinical outcomes must be qualitatively and quantitatively measured and evaluated. The variables typically used to measure outcomes are patient safety and care. Specific factors for determining the success of the ECUS are as follows

- Errors: The number of clinical mistakes is one of the factors of measurements. Prior to implementing the system, a baseline measurement should be determined in order to effectively compare the number of incidents following implementation. Should the system prove effective, there should be a reduction in the number of errors that occur as a result of inaccurate information

- Time on records: The amount of time that health care practitioners spend on records and paperwork should also be compared pre- and post-implementation. The Emerald Workload Measurement System is in place to measure this data.
- Availability of Information: The time that it takes for information to be available should ideally be reduced. The changes to this factor can be measured by determining the difference in time that it takes for information entered into either the manual CUS or the ECUS to be seen and used.
- Satisfaction: Though it may be hard to measure, users should feel as if the system has tangibly improved the care that they are able to give to patients as well as their health outcomes.

#### 5.4. Evaluation Techniques and the implementation of the Evaluation:

The primary technique of evaluation was the walkthrough method because it is very fast and allows for rapidly determining results. This technique can be used very early on in the design period because it does not need a functional prototype, yet it provides information on the performance of the system as well as user satisfaction. By performing the walkthrough designers are able to generate user input and comments on conceived designs as well as get a better understanding of the tasks that the users want to do within the system (Riihiahho, n.d.).

Walkthroughs method was used to evaluate the functionality and usability of the new system by taking feedback of users, assessing time and effort consumed by health care providers with this new technology (Health Canada, 2003).

Other methods that are useful include surveys, questionnaires, and observational techniques that provide more detailed and specific information. These methods are recommended by the author to be done by the Department of Scientific Research in order to do a larger evaluation of ECUS. However, these methods are valuable but they were not employed in this particular project because there was not

enough time to fully carry out of these techniques. Additionally, a larger sample size would have been necessary to achieve meaningful results in such methods while the sample size available would not have allowed for statistically significant results.

The first step in carrying out the walkthrough method was to select the times that the sessions were to be carried out between those involved i.e.; the author, IT experts and the coders. The sessions were given two weeks. The first was between March 23rd and March 27th and the second was between the 30th of March and the 3rd of April. These sessions were divided between the coders. The sessions were carried out within the hospital specifically the Code Unit which is where the new system has been implemented.

Each participant is assigned their own role in the evaluation. The IT experts administer the testing session and observe the results, the designers are there to inform the coders about the mechanics of the system and how it works so that they can give feedback. In order to facilitate this, the designer recorded the steps that would be necessary to carry out the tasks. All of those involved in the evaluation are experienced with the previous system and are thus proficient in its use. There is little thought for them involved in using the old system. It was found that this familiarity did carry over to the new system but there was a need to refresh their memories on the solution when using the new system. The system users discussed the way that they use the new system and explained the difference between the old and current systems in terms of their work and data flow. Following this part the author and the IT experts discussed their opinions on the system.

Following the conclusion of the session, the recorded minutes were sent over email to the IT expert from the designer who noted them during the session. These notes were organized and compiled to document the result of the evaluation session.

## 5.5. Evaluation results:

The current system is very rigid and is contributing to a number of the issues and problems that the Code Unit faces. The work conducted over the sessions showed that there is potential for major improvement using the new system. One of the main things that came out of the sessions is that the KAMC administration should be convinced to make changes to its existing policy. The changing of EMR policy and giving the authority to the coders were the reasons of the following benefits:

- The cost effectiveness of the recording system was improved according to administration reports as evidenced by decreasing the number of printed pages, toner cartridge, and increasing of ROI return of investment which takes material and personnel cost into consideration.
- Time efficiency was promoted as evidenced by the recording process becomes consumed less time as coders' verbalization. The coders were able to access all relevant information easily and in a timely fashion, do not need to perform any manual searching and typing codes and do not need to do manual statistics works.
- The clinical outcome and patient health care were improved as evidenced by decreasing the incidence of medical errors and adverse event according to quality department reports.



## 6. Conclusion:

The key issue related to this project is that the health care providers are unable to access medical codes in EMR. In order to offer evidence and effective based health care, it is very important that medical codes must be available in EMR and MPS.

Working in KAMC was very interesting and it granted the author many of new skills. Reinforced her ability to work with a team, lead, think critically, and communicate with others. A lot of time was spent understanding the existing code unit system at KAMC and modifying it and replacing it with a new one. However, Applying of any new system at the KAMC consumes a lot time and effort to see its actual results.

Demonstrating ECUS at KAMC can improve health and patient outcomes, which move the hospital toward better quality of care.

## 7. Recommendations:

- Setting obligation on the company which provide the system or any other company to give the KAMC staff the authorization to add and modify on the system as well as ask the company to provide clear information and train staff on the provided system.KAMC should review its policies related to recording system to improve its quality of information that will lead to better outcomes for its patients and employees.
- It is recommended for KAMC to perform further studies to ensure the effectiveness of this system such as measuring time spent by coders in the new system and compare them with the old one using Emerald Workload Measurement System, measuring the incidence of medical errors every specific time interval and comparing them.

- KAMC is faced some problems related to code unit which must be resolved by the hospital. For example, the code unit activities cannot be done when the discharge patients' files are not completed that means the delay in discharge files result the delay for coding so the coding data is not up to date of patient discharge.
- It is recommended to add a new area in the medical records Department and hiring translators to do the translation work inside KAMC rather than sending the physicians' notes to Egypt. This solution will allow coders to get the notes with the discharge patient record instead of reading the entire record with the discharge summary which will make their job easier and save time and effort.

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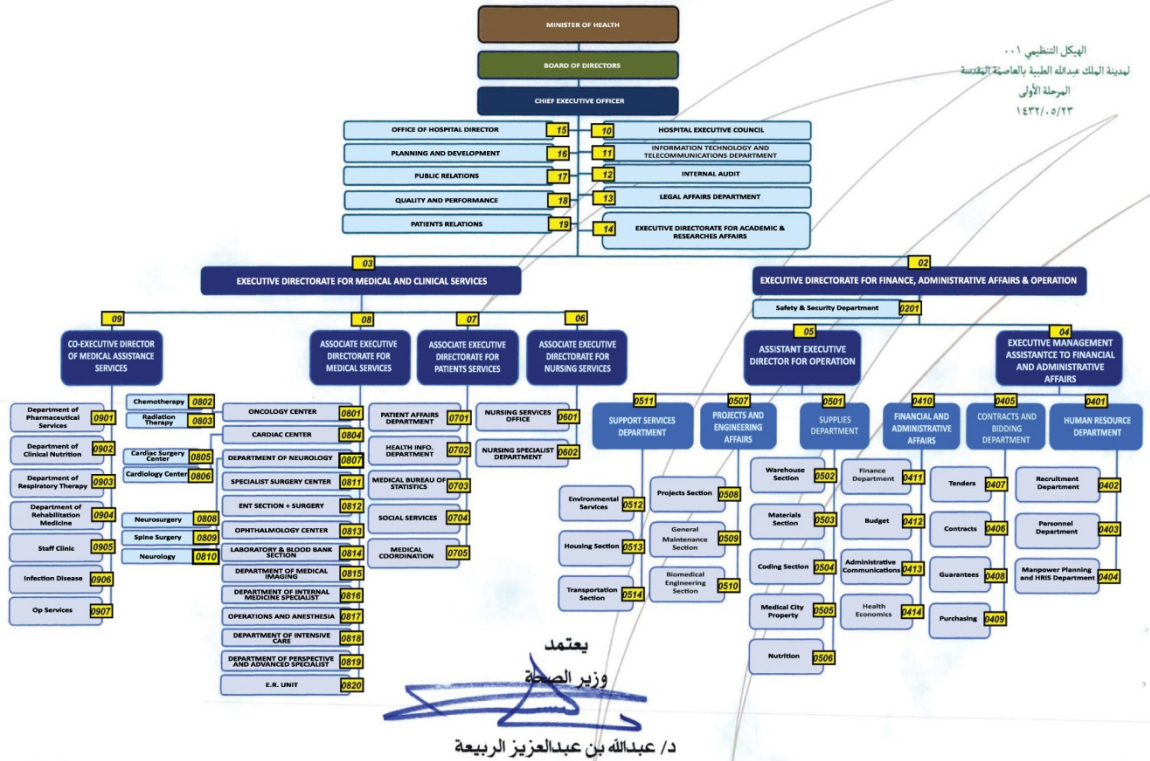
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# Appendix

Figure 1: KAMC Organizational Chart from KAMC Website.



يعتمد  
وزير الصحة  
د/ عبدالله بن عبدالعزيز الربيعه

Figure 2: ITD Organizational Chart by The author.

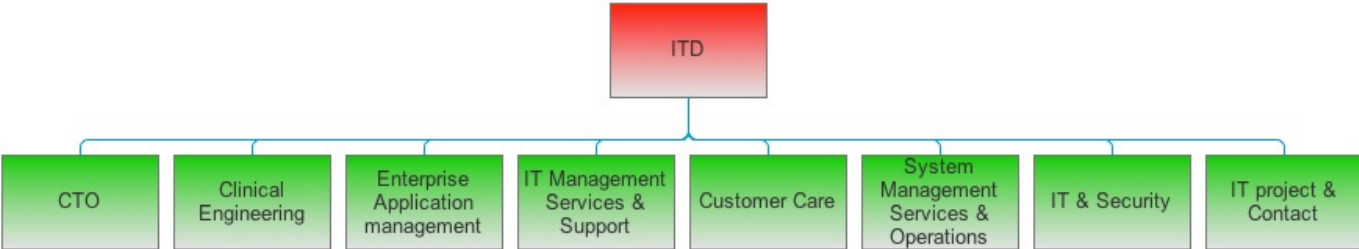


Figure 3: MRD Organizational Chart by The author.

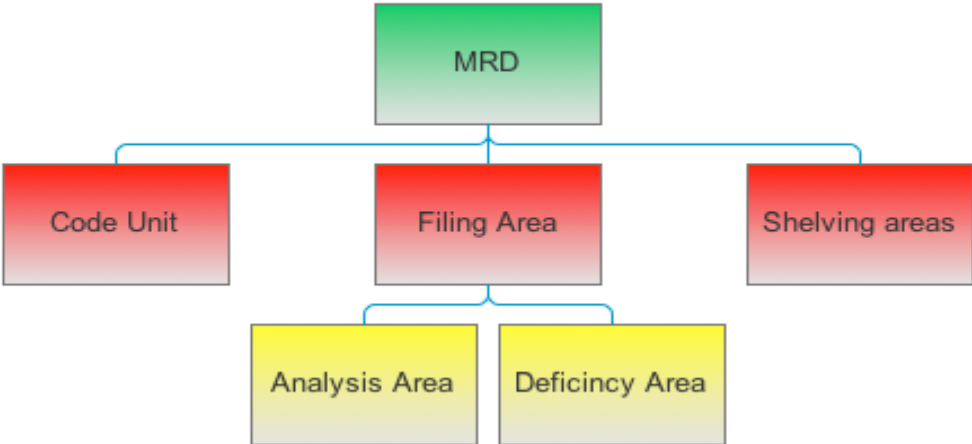


Figure 4 – Old Code Unit System Business Process Model by The author.

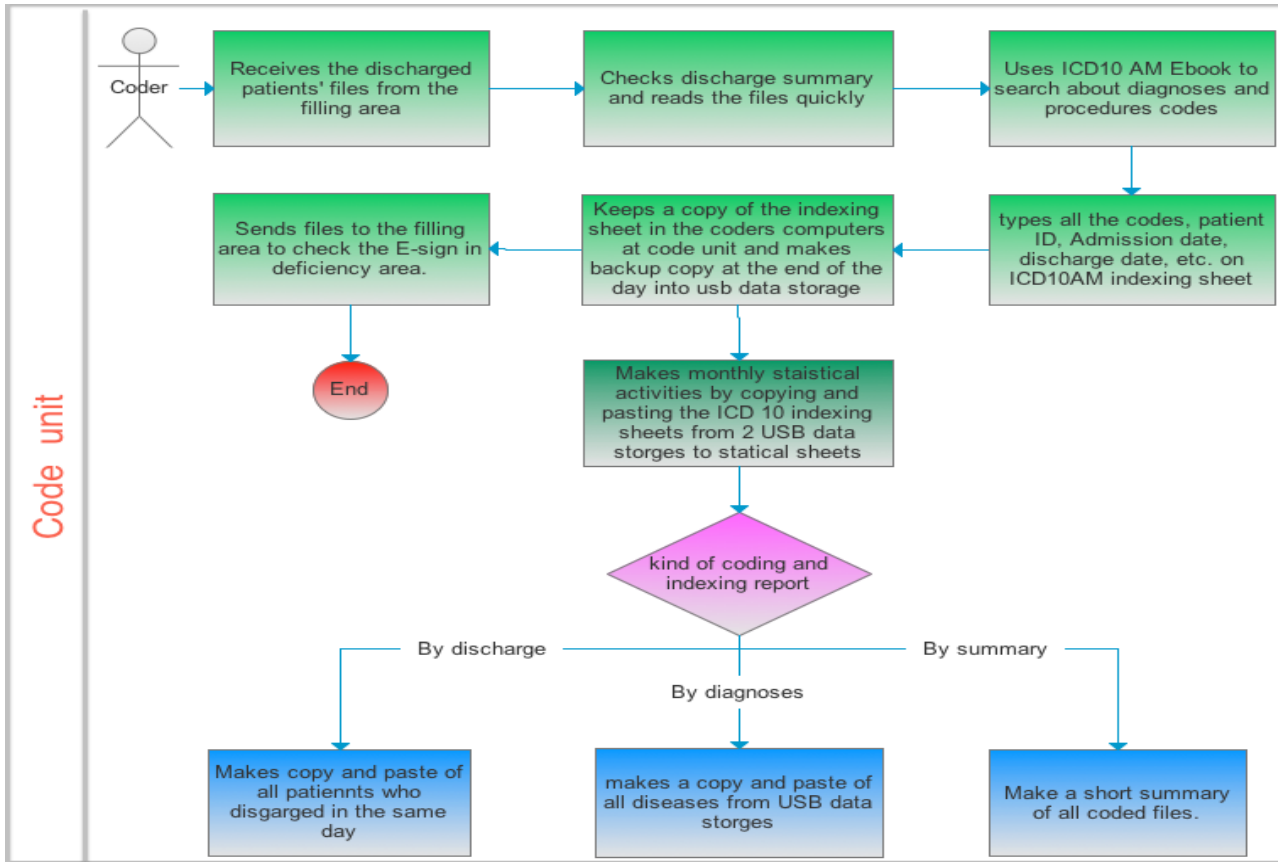


Figure 5 - Current ECUS Business Process Model by The author.

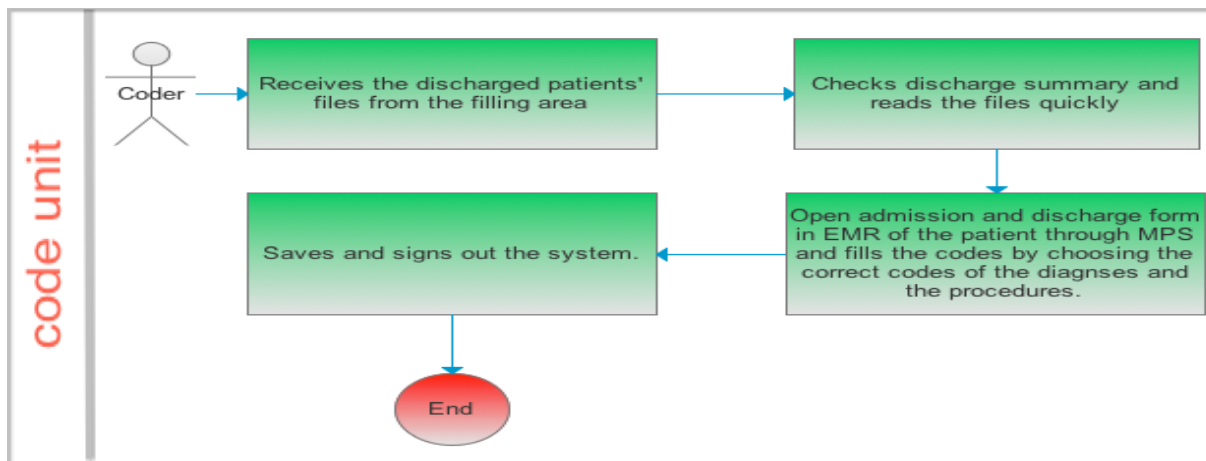


Figure 6: Snapshot of ICD10 AM Indexing Sheet from the Code Unit at KAMC.

D70-D77 -Other diseases of blood - Microsoft Excel (Product Activation Failed)

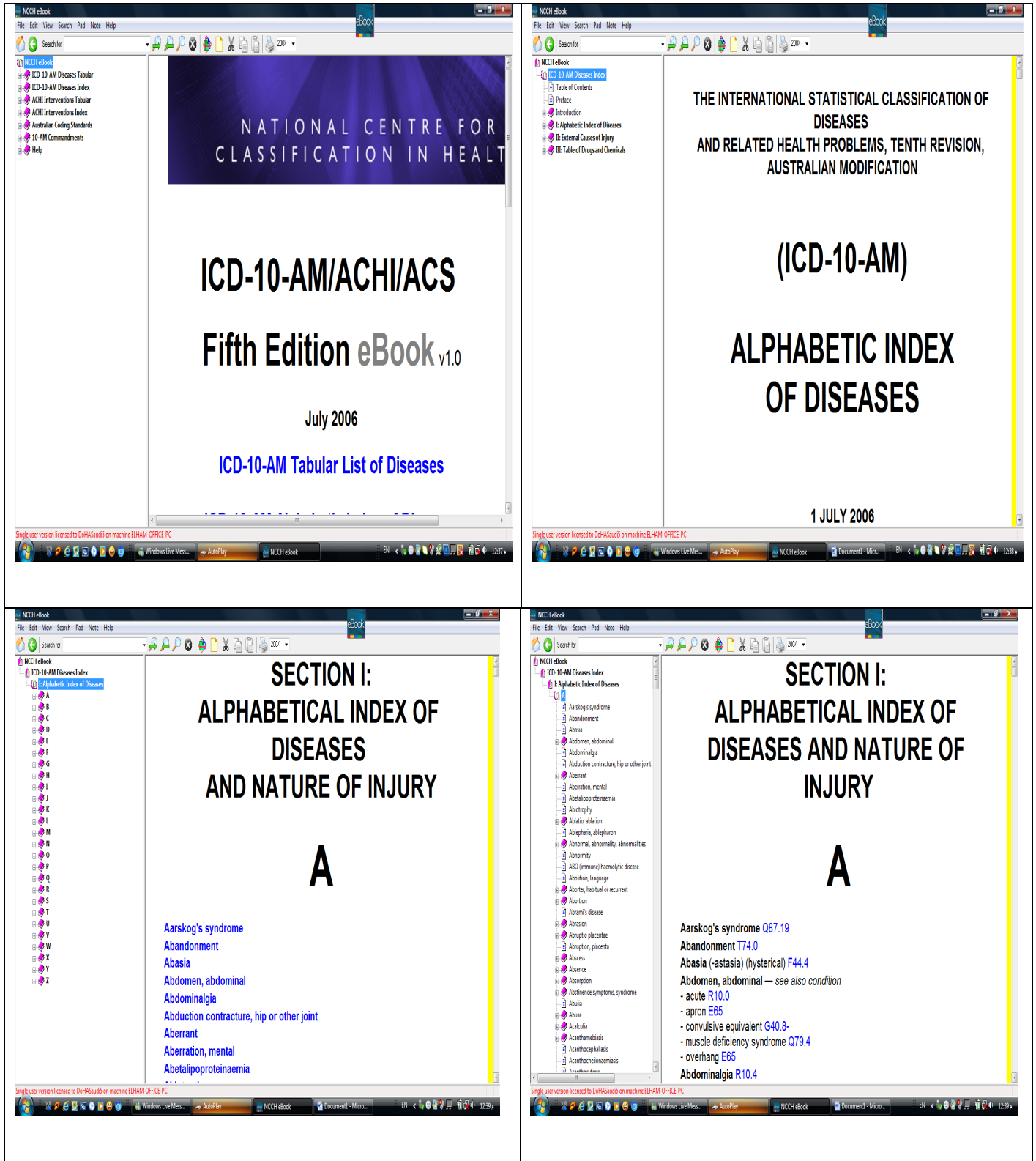
File Home Insert Page Layout Formulas Data Review View Kutools Enterprise Nitro PDF Professional

Clipboard Font Alignment Number Styles Cells Editing

K7

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2														
3	Disease:	<b>D 70 - AGRANULOCYTOSIS</b>												
4														
5	Admission Date	Discharge Date	Hospital Days	MRN	Patient Name	Nationality	Age	Service Unit	Associate Condition or Complication	Most Responsible Physician (MRF)	Operations	Surgeon	Status	
6						M	F							
7	07/09/2012	12/09/2012	5			SAUDI	51	ONCO	C50.9		96199-00[1920]	.....	IMPROVE	
8	23/09/2012	01/10/2012	8			SAUDI	51	ONCO	C50.9,K59.0		N/A	.....	IMPROVE	
9	22/09/2012	27/09/2012	5			SAUDI	49	ONCO	C50.9,E11.9,I10		N/A	.....	IMPROVE	
10	02/09/2012	09/09/2012	7			SAUDI	49	ONCO	C50.9,E11.9,I10		13706-02[1893]	.....	IMPROVE	
11	25/10/2012	29/10/2012	4			SAUDI	56	ONCO	C81.9,M9650/3,B24		N/A	N/A	IMPROVE	
12	23/09/2012	26/09/2012	4			SAUDI	56	ONCO	C81.2,M9652/3,B24		N/A	N/A	IMPROVE	
13	19/11/2012	24/11/2012	5			CHADI	51	HEMA	D64.9,C91.10,I25.9		13706-02[1893],92064-00[1893]	.....	IMPROVE	
14	23/09/2012	01/10/2012	8			SAUDI	23	HEMA	K59.0,C50.9		N/A	.....	IMPROVE	
15	07/09/2012	12/09/2012	5			Saudi	51	ONCO	C50.9		96199-00[1920]	.....	IMPROVE	
16	31/01/2013	06/02/2013	6			SUDANES	37	ONCO	C50.9		.....	.....	IMPROVE	
17	25/02/2013	27/02/2013	2			SAUDI	20	ONCO	C81.9,M965/3		.....	.....	IMPROVE	
18	27/02/2013	07/03/2013	8			YAMANII	59	ONCO	C50.9		.....	.....	IMPROVE	
19	03/03/2013	03/07/2013	4			AFGHANI	27	HEMA	C92.00,Z51.5		.....	.....	IMPROVE	
20														
21														
22														
23														

Figure 7: Snapshot of ICD10 AM eBook from the Code Unit at KAMC.





NCCH eBook

File Edit View Search Pad Note Help

Search for

NCCH eBook

ICD-10-AM Diseases Index

Alphabetic Index of Diseases

A

Abortion

- accidental
- attempted (failed) (induced) (nonmedical)
- complicated (by)
  - failed
  - fetus or newborn
  - following threatened abortion
  - habitual or recurrent
  - illegal
  - induced
  - legal (induced)
  - medical
  - missed
  - operative
  - spontaneous
  - therapeutic
  - threatened (spontaneous)
  - tubal

Abortion (complete) (incomplete) O06.-

- accidental O03.-
- attempted (failed) (induced) (nonmedical) O07.9
- - complicated by
  - - - afibrinogenaemia O07.6
  - - - cardiac arrest O07.8
  - - - chemical damage of pelvic organ(s) O07.8
  - - - circulatory collapse O07.8
  - - - defibrination syndrome O07.6
  - - - electrolyte imbalance O07.8
  - - - embolism (amniotic fluid) (blood clot) (pulmonary) (septic) (soap) O07.7
  - - - endometritis O07.5
  - - - haemorrhage (delayed) (excessive) O07.6
  - - - infection, genital tract or pelvic O07.5
  - - - intravascular coagulation O07.6
  - - - laceration of pelvic organ(s) O07.8
  - - - oliguria O07.8
  - - - oophoritis O07.5
  - - - parametritis O07.5
  - - - pelvic peritonitis O07.5
  - - - perforation of pelvic organ(s) O07.8
  - - - renal failure or shutdown O07.8
  - - - salpingitis or salpingo-oophoritis O07.5
  - - - sepsis O07.5
  - - - septic shock O07.5
  - - - septicaemia O07.5
  - - - shock O07.8
  - - - - septic O07.5

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Search for

NCCH eBook

ICD-10-AM Diseases Index

Alphabetic Index of Diseases

A

Abortion

- complicated (by)
  - - - afibrinogenaemia ..... 8 ..... 3
  - - - cardiac arrest ..... 8 ..... 1
  - - - chemical damage
    - - - bladder ..... 8 ..... 3
    - - - bowel ..... 8 ..... 3
    - - - broad ligament ..... 8 ..... 3
    - - - cervix ..... 8 ..... 3
    - - - periurethral tissue ..... 8 ..... 3
    - - - uterus ..... 8 ..... 3
  - - - circulatory collapse ..... 8 ..... 3
  - - - condition specified NEC ..... 8 ..... 3
  - - - damage to pelvic organs or tissues NEC ..... 8 ..... 3
  - - - defibrination syndrome ..... 6 ..... 1
  - - - electrolyte imbalance ..... 8 ..... 3
  - - - embolism ..... 7 ..... 2
  - - - air ..... 7 ..... 2
  - - - amniotic fluid ..... 7 ..... 2
  - - - blood clot ..... 7 ..... 2
  - - - pulmonary ..... 7 ..... 2
  - - - pyaemic ..... 7 ..... 2
  - - - septic ..... 7 ..... 2
  - - - septicopyaemic ..... 7 ..... 2
  - - - soap ..... 7 ..... 2
  - - - endometritis ..... 5 ..... 0
  - - - haemorrhage (delayed) (excessive) ..... 6 ..... 1
  - - - infection

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ICD-10-AM Diseases Index

Alphabetic Index of Diseases

A

Abortion

- complicated (by)
  - - - air ..... 7 ..... 2
  - - - amniotic fluid ..... 7 ..... 2
  - - - blood clot ..... 7 ..... 2
  - - - pulmonary ..... 7 ..... 2
  - - - pyaemic ..... 7 ..... 2
  - - - septic ..... 7 ..... 2
  - - - septicopyaemic ..... 7 ..... 2
  - - - soap ..... 7 ..... 2
  - - - endometritis ..... 5 ..... 0
  - - - haemorrhage (delayed) (excessive) ..... 6 ..... 1
  - - - infection
    - - - genital ..... 5 ..... 0
    - - - pelvic ..... 5 ..... 0
    - - - urinary tract ..... 8 ..... 3
    - - - intravascular coagulation ..... 6 ..... 1
  - - - laceration
    - - - bladder ..... 8 ..... 3
    - - - bowel ..... 8 ..... 3
    - - - broad ligament ..... 8 ..... 3
    - - - cervix ..... 8 ..... 3
    - - - periurethral tissue ..... 8 ..... 3
    - - - uterus ..... 8 ..... 3
    - - - metabolic disorder ..... 8 ..... 3
    - - - oliguria ..... 8 ..... 3
    - - - oophoritis ..... 5 ..... 0
    - - - parametritis ..... 5 ..... 0

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ICD-10-AM Diseases Tabular

Tabular List of Inclusions & Subcategories

O03 Spontaneous abortion

V1518

See subdivisions

Includes: miscarriage

Use additional code from category O09.- to identify duration of pregnancy.

O04 Medical abortion

V1511.1518

See subdivisions

Includes: termination of pregnancy:

- legal
- therapeutic

therapeutic abortion

Use additional code from category O09.- to identify duration of pregnancy.

O05 Other abortion

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ICD-10-AM Diseases Tabular

Tabular List of Inclusions & Subcategories

O03-006

The following fourth-character subdivisions are for use with categories O03-006:

- 0 Incomplete, complicated by genital tract and pelvic infection  
With conditions in O08.0
- 1 Incomplete, complicated by delayed or excessive haemorrhage  
With conditions in O08.1
- 2 Incomplete, complicated by embolism  
With conditions in O08.2
- 3 Incomplete, with other and unspecified complications  
With conditions in O08.3-008.9
- 4 Incomplete, without complication
- 5 Complete or unspecified, complicated by genital tract and pelvic infection  
With conditions in O08.0
- 6 Complete or unspecified, complicated by delayed or excessive haemorrhage  
With conditions in O08.1
- 7 Complete or unspecified, complicated by embolism  
With conditions in O08.2
- 8 Complete or unspecified, with other and unspecified complications  
With conditions in O08.3-008.9
- 9 Complete or unspecified, without complication

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**Figure 8: Snapshot of Coding and Indexing Reports by Diagnosis and Discharge Date and Summary of the Reports from the Code Unit at KAMC.**

**coding report (september 2012) - Microsoft Excel (Product Activation Failed)**

DISCHARGED DATE	FILE NUMBER	PRINCIPAL CODE	ASSOCIATE CONDITION OR COMPLICATION	DEPARTMENT	PHYSICIAN
04/09/2012		A18	.3,K63.3,Z85.0,Z92.4,	DLC	
12/09/2012		C11	.9,M8000/3,C78.7,M8170/6	ONCOLOGY	
23/09/2012		C11	.3,I21.8,E11.9,I10	ENT	
09/09/2012		C16	.9,E11.9	ONCOLO	
04/09/2012		C18	.7,M8144/3,.I10	ONCO	
11/09/2012		C18	.7,8144/3,E11.9,Z92.22	ONCOLOGY	
14/09/2012		C18	.9,C78.5,	ONCOLOGY	
14/09/2012		C18	.9,M8144/3	ONCO	
17/09/2012		C18	.7,M8144/3,C78.7,M8170/6	ONCOLOGY	
18/09/2012		C18	.7,M8144/3,C78.7,M8170/6	ONCO	
19/09/2012		C18	.9,C78.7,	ONCOLOGY	
25/09/2012		C18	.7,M8144/3,E11.9,Z92.22	ONCO	
25/09/2012		C18	.9,M8144/3,C78.7,M8170/6,E11.9	ONCO	
04/09/2012		C18	.9,M8144/3	ONCO	
05/09/2012		C18	.9,E11.9,	ONCO	
06/09/2012		C18	.7,M8144/3	ONCO	
11/09/2012		C18	.9,M8144/3,C78.7,M8170/6,E11.9	ONCO	
12/09/2012		C18	.9,M8144/3	ONCO	
15/09/2012		C18	E14.9,I10	ICU	
17/09/2012		C18	.7,	ONCO	
22/09/2012		C18	.7,M8144/3	ONCO	
23/09/2012		C18	.9,E11.9,	ONCO	
27/09/2012		C18	.9,C78.0	ONCO	
28/09/2012		C18	.9,M8144/3	ONCO	

**coding report (september 2012) - Microsoft Excel (Product Activation Failed)**

M720 surgeon


Admission Date	Discharge Date	Herital Day	MRN	Patient Name	National ID	Age	Sex	Service Unit	Associate Condition or Complication	Most Responsible Physician (MRF)	Operations	sergeon	Status
<b>Disease: H33 - RETINAL DETACHMENTS AND BREAKS</b>													
26/08/2012	01/09/2012	6			SAUDI	23	M	SSU	.4,H26.9		42702-04[197]		IMPROVED
<b>Disease: H33 - RETINAL DETACHMENTS AND BREAKS</b>													
02/09/2012	02/09/2012	0.5			SAUDI	50	F	DCU	.4,H25.9,J45.9		42702-04[197]		IMPROVED
05/09/2012	05/09/2012	0.5			SAUDI	68	F	DCU	.4,E14.9,I10		42731-01[200],40702-04[197]		IMPROVED
<b>Disease: H35</b>													
02/09/2012	02/09/2012	0.5			SAUDI	63	F	DCU	.3,E11.9		42725-00[207]		IMPROVED
<b>Disease: H40 - GLAUCOMA</b>													

**SUMMARY OF CODING AND INDEXING REPORT FOR THE MONTH OF SEPTEMBER 1-30, 2012**

CODE	TOTAL	CODE	TOTAL	CODE	TOTAL
A18	1	E11	1	J28	1
C11	2	H04	3	K27	1
C16	1	G56	1	K22	1
C18	20	H11	1	K29	2
C29	1	H21	1	K30	1
C20	4	H39	3	K44	2
C24	3	H40	1	K51	2
C40	1	H25	11	K60	1
C41	3	H26	12	K62	1
C49	1	H35	1	K63	1
C50	9	H40	2	K76	2
C61	1	H43	2	K90	1
C71	1	H56	1	M17	2
C80	1	H66	4	R47	1
C79	2	I24	4	R57	1
C83	3	H21	1	Z08	2
C92	2	I21	1	Z12	1
C85	1	I42	1	Z13	1
C91	1	I50	1	Z31	1
D64	1	I84	1	Z96	1
D70	7	J33	2	Z51	261
E10	1	J84	2		287
	67		57		

67 + 57 + 287 = 411  
TOTAL DIS-411  
TOTAL CODIED FILES 411

Figure 9: Snapshot of Admission and Discharge Form from MPS at KAMC.

 <p>مدينة الملك عبد الله الطبية KING ABDULLAH MEDICAL CITY IN HOLY CAPITAL</p>		Med. Record No.:	
		Patient Name:	
		D.O.B.:	Sex:
		Nationality:	
		I.D. No.:	Unit:
<b>ADMISSION AND DISCHARGE FORM</b>		<b>نموذج الدخول والخروج</b>	
Place of Birth:	مكان الميلاد:	Marital Status:	الحالة الاجتماعية:
Occupation:	المهنة:	Religion:	الديانة:
Address & Tel. No.:		العنوان ورقم الهاتف:	
Relative's Name:		أسم أقرب شخص:	
Source of Referral:	آخر Other	الإسعاف والطوارئ A/E	العيادات الخارجية O.P.
INT. TRANS.:		التحويل الداخلي:	
Time of Admission:	وقت الدخول:	Date of Admission:	تاريخ الدخول:
مستقرة Stable		حرجة Critical	حالة المريض عند الدخول: Patient Condition
رقم التصنيف الدولي I.C.D. No.			
Provisional Diagnosis:	التشخيص المبدئي:		
Final Diagnosis:	التشخيص النهائي:		
Other Diagnosis:	تشخيصات أخرى:		
Surgical Operation:	العمليات الجراحية:		
Anesthesia:	أخرى Other	نصفي Spinal	موضعي Local
			كلي General
Date of Discharge	تاريخ الخروج	Time of Discharge	وقت الخروج
			Length of Stay
Condition on Discharge:	أخرى Other	وفاة Dead	حسب طلبية AMA
			تحویل Ref.
			تحسن Improved
			شفاء Cured
Consultant:	الاستشاري:	Attend. Physician:	الطبيب المعالج:
Signature:	التوقيع:	Signature:	التوقيع: