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A FRAMEWORK FOR DEVELOPING A BREAST CANCER MONITORING SYSTEM FOR LOW AND MIDDLE INCOME COUNTRIES

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Abstract: Cancer is a leading cause of death worldwide and accounted for 13% of all deaths in 2008 and more than 70% of all cancer deaths occurred in low and middle income countries (Globocan, 2008) such as the Philippines. Breast cancer is among the leading types of cancer which is high on mortality rate. In 2010, breast cancer is the leading cancer type in the Philippines to be the most detrimental to women, accounting for almost 30% of all female malignancies (Valmero, 2010) and a survival rate of below 40% compared to the 80-90% survival rate of developed countries (Philippine Information Agency, 2010). The framework aims to address the need for consistent monitoring of the breast cancer patients' progress from initial diagnosis, treatment procedures, up to death, through the development of a Breast Cancer Monitoring System. The framework includes the system features and modules that should be designed in order to manage the day-to-day processes that comprise the different components that contribute to their patients' overall health progress. It also shows the concepts and technologies that will be used to develop the system, as well as the data that will be needed in order to produce relevant information such as statistics and graphs, for monitoring and decision-making purposes. In the long run, the framework is perceived by the proponents to be a stepping stone towards reducing the mortality rate of breast cancer cases, intensifying efforts in providing breast cancer cure and early detection prevention programs and services that will cater to those diagnosed with breast cancer and to those who are vulnerable to the development of the disease, and helping raise awareness and early detection programs and enforcing tracking procedures in the area of breast cancer.

Key Words: breast cancer monitoring; breast cancer in the Philippines; framework for monitoring breast cancer cases; breast cancer information system

1. INTRODUCTION

The framework for developing a breast cancer monitoring system focuses on using an information system that improves data collection in order to produce essential information about breast cancer cases in low and middle income countries. The theoretical framework of the study is patterned through the Data Quality Management model which will be the cornerstone of the research as it will be the guide on how to effectively transform data into relevant and useful

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information. It comprises of solutions such as monitoring board generation, record management and case mapping.

The main objective of the research is to help develop a system that will aid the monitoring of patients' conditions, trends and situations concerning breast cancer cases by improving the processes, managing the patient records, and generating relevant maps and reports. Its scope covers only the low and middle income countries and is limited by the data that will be gathered by the group.

2. METHODOLOGY

The traditional method of gathering data is through the use of forms that are later on filed for storage purposes. A medical center's daily processes usually involve forms filled by patients and forms filled by doctors. These forms that are later filed either in its raw format or encoded comprise the patient's medical record. In some public hospitals that follow this traditional method, all medical records of patients are kept in a centralized repository and access to these records often require a two to three days prior notice.

The predicament faced in the type of method mentioned above is the tedious process recording and retrieving of data and producing relevant information from the data collected. Considering that the two primary sources of data in hospitals and breast care centers are from the patient and the doctors encountered, data obtained from these sources play an important role in determining the relevance of the information produced.

In building the framework for breast cancer case monitoring and mapping, it is essential to focus on the the purpose and usage of data, the means of collecting data through processes involved, the tools used to store and archive data, and the processing of raw data to produce useful information. Hence, the Data Quality Management (DQM) model was used in building the theoretical framework to emphasize on these four domains: Application, Collection, Warehousing and Analysis.

Data collected and processed by the system should be accurate, accessible, comprehensive and consistent. The characteristics of data quality are greatly considered.

- Data Accuracy - measurement as to how much the data is free of errors
- Data Accessibility - the extent as to how data can easily be obtained with corresponding protections and control along the process

- Data Comprehensiveness - the extent as to how the required information is present in the data
- Data Consistency - the extent as to how data remains the same among other areas and applications
- Data Currency - the extent as to how the data is up-to-date
- Data Definition - specific meaning of data element
- Data Granularity - the level of detail in the data set
- Data Precision - the extent as to which data is stated to support its purpose
- Data Relevancy - the extent as to how data is useful based on the reason they are collected
- Data Timeliness - the extent as to when the needed data is available within the useful time frame. (AHIMA, 2012)

3. RESULTS AND DISCUSSION

The framework centers on a Breast Cancer Monitoring System, which is an information system that will be most beneficial to Breast Care Centers because of its features and modules that are designed to manage day-to-day processes that comprise different components that contribute to their patients' overall health progress. In the long run, it is targeted to be a stepping stone towards reducing the mortality rate of breast cancer cases intensifying efforts in providing breast cancer cure and early detection and prevention programs and services that will be most beneficial to those diagnosed with breast cancer and to those who are vulnerable to the development of the disease. It is also a tool of great potential in raising awareness, implementing early detection programs and enforcing tracking procedures in the area of breast cancer. This will be made possible through processing all the necessary and relevant information obtained from recorded data that will aid in decision support of non-government organizations, government officials, potential sponsors/donors for resource allocation, project implementations, and for further studies and research developments.

As shown in Figure 1, the framework contains the following components: domains of DQM (as described in the previous section), problem areas, system modules, technologies, users, and inputs/outputs. The system modules include schedule monitoring board, case monitoring board, records management, case mapping and report generation, all of which are targeted to solve the following problems:

- Difficulty in tracking patients that need schedule follow-ups
- Inadequate presentation of relevant information that will aid in monitoring patients' overall health progress
- Inefficient storage procedures that cause delay in retrieval of patient records when needed



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- Delay and obstruction in decision-making for procedures (e.g treatment, medications)

The system is intended to be web-based that uses the radio frequency identification (RFID) and short messaging system (SMS) technologies. It will be used by the staff, nurses, and doctors of the breast cancer centers. The three key inputs of the system which are important to produce relevant information are the patient information, doctor's orders, and credible sources of cancer registry data. The three key information produced by the system are the patients' charts, breast cancer awareness (BCA) reports and case references, and reports, statistics, graphs.

DATA QUALITY MANAGEMENT MODEL

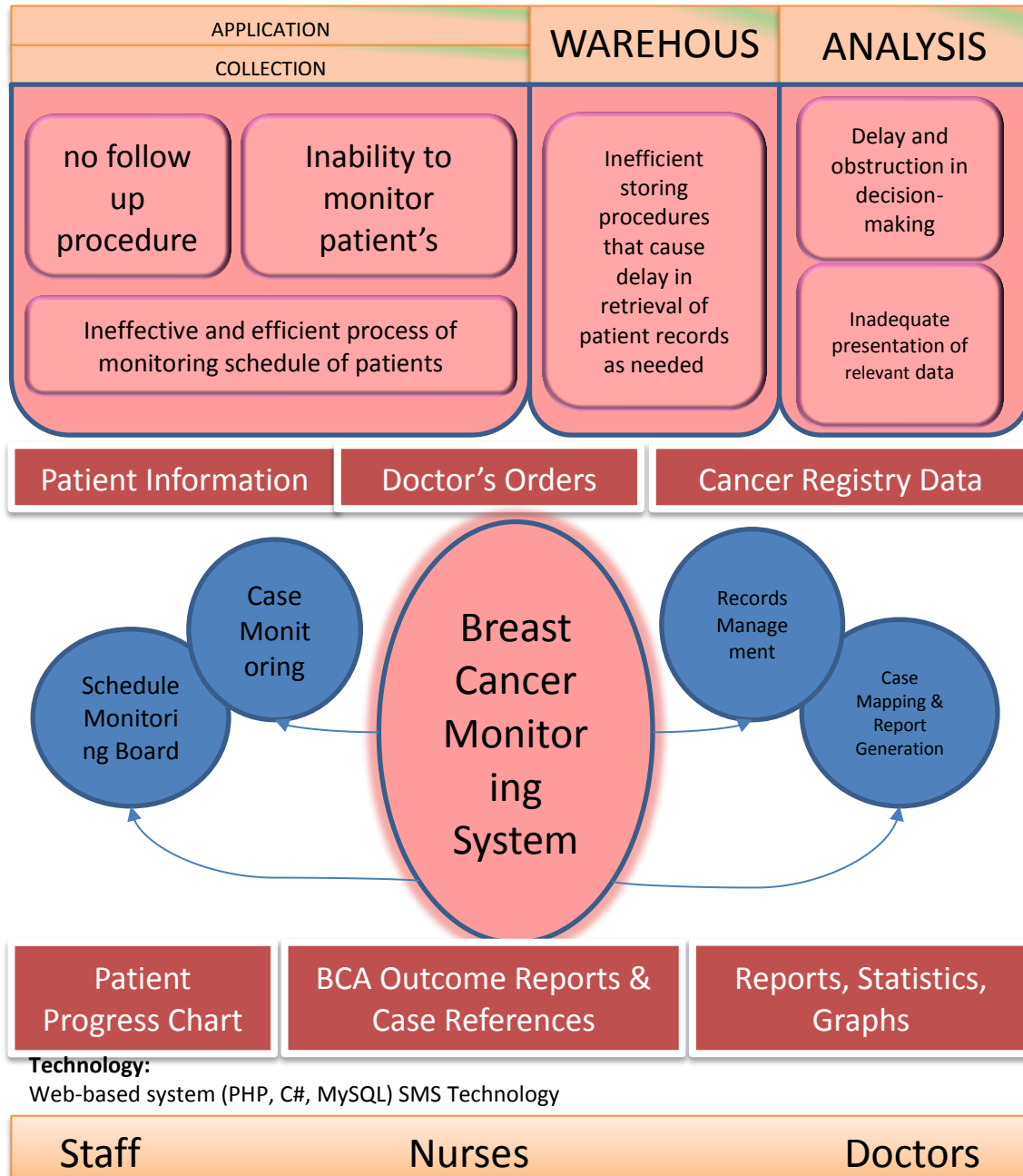


Figure 1. Framework for Developing a Breast Cancer Monitoring System



4. CONCLUSIONS

The problems discussed on the framework involves the current process of monitoring scheduled patients for treatments or consultations and no follow-up procedures, the inefficient storing procedures that cause delay in the retrieval of patient records that should be accessed real-time resulting to the obstruction in doctor's decision making, and the inaccuracy of data used to produced census reports and inability to optimize the use of data obtained from patient's records to produce relevant statistics and reports. In conclusion, the framework in the above section is able to address the problems faced by the existing system through the following solutions: schedule monitoring board, case monitoring board, records management, and case mapping and report generation.

The framework provides possible venues for research and system development to gradually lower the incidence and mortality rate of breast cancer. Given the framework created above that focuses primarily on the data quality model that produces process improvement, patient records management, and reports, statistics & map generation, the system it can produce has a lot of potential in taking information and communications technology for health management to greater heights. A successful implementation of the Breast Cancer Monitoring System could also make its development framework a foundation in developing monitoring systems for different cancer sites.

5. REFERENCES

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