



## My Cancer Health Manager

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**Abstract:** In the Philippine context, cancer is ranked as the third top killer disease in the Philippines with a total number of 47, 732 deaths in the year 2010 [1]. What is more interesting is that not all cancer patients die because of the cancer but by complications that arise due to the illness. Cancer patient are advised by their doctors to change their lifestyle in order to reduce complications and in order to do that close monitoring of their day to day activities are suggested. Nowadays, with the use of technology one can easily record what they eat, drink and do within a day. So how can a cancer patient take advantage of ICT in order to manage their illness?

In this study, the concept of personal informatics will be used in order to enable cancer patients to track and monitor their recovery progress. Personal health informatics is a tool focused on assisting people to collect personal health-relevant information that aims on improving self-understanding by gaining self-knowledge about one's behaviours, habits, thoughts, and healthy lifestyle. A mobile application will be developed that can assist the cancer patient on recording their personal informatics which can be eventually be shared with their doctors. In order to develop the application, some medical experts and cancer patients have been interviewed to gain knowledge of how the illness is managed. Related system was reviewed and benchmarked in order to formulate the application design. A prototype will be developed and be will tested by selected cancer users to test its usability. The application will act as a health manager that will ensure that the patient is following the prescribed treatment by the doctor.

**Key Words:** Cancer Patient; Health Monitoring; Personal Informatics; E-Health; Health Manager

### 1. INTRODUCTION

Cancer is a known disease which can attack on different parts of a person's body. There are more than 100 different types of cancer around the world and one them is Colon Cancer. In the Philippines Colon cancer is on the rise according to the

Philippine Cancer Society which is estimated to at least 8,000 cases. The Philippines also ranks low in global cancer statistics in terms of age standardized survival rates [3]. Colon Cancer Patients usually have symptoms primarily when blood is found in a patient's stool. Other symptoms include; change in bowel habits, alternating diarrheic then constipation,

persistent abdominal discomfort, gas or pain within abdominal pain with bowel movement, a feeling that bowel doesn't empty completely, unexplained Patients that are diagnosed with Cancer will have a difficult time in both preventing and treating the ailment. Problems arise such as maintaining medical records in hospitals are troublesome for both doctors and patients alike. The transfer to the digitized era has made man to pursue technology as the next best option in incorporating health care services. One of the technologies is E-health. E-health is an emerging technology which can be described as "Internet technologies applied to health care industry [4]. Basically, E-health is a coined new method of implementing health care services through the use of information and communications technology wherein it acts as a fast track of delivering health information to health care providers, health care consumers, and its stakeholders.

The group had identified the problem "Patient does not properly monitor their health". The group sees that all cancer patients has a role in managing their personal health since the lifestyle they opt to live before may put more toll to their own health. Cancer patients should always be wary of their own health and wellness by monitoring their health constantly. Most cancer patients fail to do so because of the associated problem causes which are:

- People - Forgets doctor's instructions, forgets doctor appointment, forgets to recall side effects, and forgets medication.
- Material – Loss of health record, health records are not accessible at all times.
- Methods – Incomplete recording of medical information, no record keeping for patient lifestyle, patient forgets to track vital signs, no tracking of patient's diet.

Failure of monitoring personal health is a not just a simple problem concerning the wellness of the patient. It is a major issue for the cancer patient since monitoring oneself plays a crucial role in their recovery period. The life of an individual is at stake in this context; and not a liability in an organizational level. The problem about the patient does not properly monitor their health should be addressed thoroughly in this study because it is the

main source of health updates for the patient's condition; acting as the communication channel between the patients themselves, and his/her attending healthcare provider. Moreover, the main source of information to evaluate a patient's condition is through monitoring.

## 2. METHODOLOGY

The proponents form a general research on how the colon cancer patients are treated/diagnosed, track and maintain their health. The first step is to visit private and public hospitals who treat cancer patients and find out how a patient is treated. The second step is to interview professionals that specializes in the medical field particularly Oncologists and Laboratory technicians due to the need for proper forms and processes. To emphasize the personal informatics the proponents also interviewed Colon Cancer Patients in order to gather data about a person's behaviour towards a specific illness. The intention for these visits is to design the process that will help the group develop the system. This will act as the generic test bed for the research. Discovered problems from the constructed problem statement are disclosed subsequent to the interviews and analysis.

A system design was formulated after the gathering enough necessary information to address the problems constructed. Since systems related to health especially connected with E-Health and Personal Informatics are rare, benchmarking of related systems requires help from professionals.

Because of the lack of knowledge and time the developers attempts to expand a system incrementally by constructing a sequence of prototypes and frequently adjust it according to the user's requirement which in time result into a final version from the merged of revised, extended earlier versions of the system. The method is called Agile which is similar to spiral model, which shows a sequence of iterations, revisions based on user feedbacks [5]. The team will be using the Agile method for the advantages that comes with it like the implementation of the scrum framework. The scrum development is consist of "Planning, Architecture and

High Level Design, Development and Closure phase" [6].

### 3. PROBLEM ANALYSIS

The group had conducted a series of interview with cancer patients and healthcare providers for cancer patients and consolidated all data collected to formulate the problem in this scope of the study. The group focused on the perspective of the patients since they are the target main user of the system and on the processes defined by the healthcare providers. Furthermore, the group analyzed the information-related problems by using the characteristics of good information as a reference. The eleven (11) characteristic of good information are: Accessible, Accurate, Complete, Economical, Flexible, Relevant, Reliable, Secure, Simple, Timely, and Verifiable. The proponents used the "Fishbone Diagram" or also known as the Ishikawa Diagram as the problem analysis technique.

The main problem was "Patient does not properly monitor their health". It shows that all cancer patients has a role in managing their personal health since the lifestyle they opt to live may put more toll to their own health. Cancer patients should always be wary of their own health and wellness by monitoring their health constantly. Most cancer patients fail to do so because of the following associated problem causes which are:

- Patients tend to forget their doctor's instructions in terms of medication and diet. They also tend to forget the next appointment with the doctor and what are the side effects that resulted from medications taken.
- Patients are not vigilant in keeping their own health records thus it is prone to lose or damage. Physicians and Nutritionists keep tracks of the lifestyle of the patient but there is no real recording of all their monitoring.
- Patient health records are not accessible at all times.
- Patients do not record of their day to day activities which are vital to the doctor thus

resulting to incomplete recording of medical information, vital signs and of patient's diet.

### 4. RESULTS AND DISCUSSION

CHEMIS (Colon Cancer Health Manager Information System) is an Android mobile and web based application designed by students from the De La Salle University Manila. The system allows the cancer patient to monitor, track, and maintain their own health condition and other users involved such as doctors and the laboratory technicians. CHEMIS aims to provide a solution that will help ease the monitoring and tracking of a colon cancer patient's health. The system is divided into four main modules: Medical Records Module, Medications Module, Patient's Complaint Module and Lifestyle and Nutrition Module.

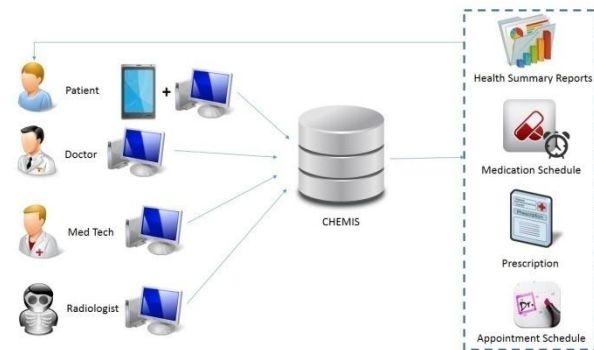


Fig. 1: CHEMIS Framework

Fig 1 shows a graphical representation of the general overview of the system.

#### 4.1 Medical Records Module

Medical records are the collection of patient health related information. This module includes but not limited to allergies, immunizations, medical and family history, surgeries and procedures, doctor's diagnosis, prescriptions, medications, vital signs and laboratory results. These records are used in order for the doctors to analyse possible problems that the patient could experience. It also helps the doctors to decide on how they should treat the patients. The CHEMIS medical records module records and update all the medical records of the patient this includes all the patient health-related information. This module is an important part of the system because the data that are recorded in this module will be used by other

modules in order to help the decision making of the patient and the doctors.

#### 4.2 Medication Module

Medications are one of the most important things that a patient should remember because these medications are used in order for their diseases to be treated. Medications for cancer are important to be taken on time and be taken regularly therefore; the CHEMIS medication module allows the patient to manage all the prescribed medication of the patient. It provides the necessary details of medications and it reminds the patient the time a medication should be taken and the amount of medication left in order to ensure consistency on medication intake. The medication module allows the doctors to see the progress of a patient medication intake and allows online prescription of over-the-counter drugs that a patient may need immediately.

#### 4.3 Patient Complaint Module

A cancer patient undergo several treatments and test therefore it is common for a patient to experience side effects or health problems. It is important for a cancer patient to be healthy for them to survive several treatments and test that is why it is important for the doctors to provide quick feedback and in some cases, medications that may prevent or cure the side effects or health problems. The CHEMIS patient complaint module provides communication between the patient and the doctor that will give the doctors the opportunity to respond quickly to the patient complaints regarding their health condition.

#### 4.4 Lifestyle and Nutrition Module

One of the important things that a patient with cancer should remember is that they need to be healthy in order for them to withstand the different treatments. These treatments and medications usually give side effects that affect their nutrition that is why it is important for a patient to have the right nutrition and lifestyle in order for their body to take the treatments. The CHEMIS lifestyle and nutrition module allows doctors to provide the right diet plan based from their patients record. Vital signs are also tracked in this module that can help the

patient set goals and achieve their target vital statistics.

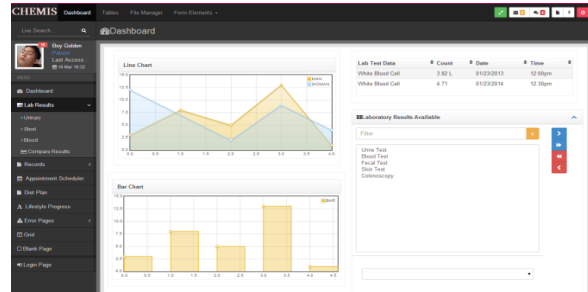


Fig. 2: Laboratory Result UI Sample

Fig 2 shows a graphical representation on how CHEMIS displays Laboratory Results after it is analysed by the corresponding Laboratory Technician.

## 5. FEATURES

### 5.1 Alarm Feature

The Alarm feature under the medication module is integrated into the system so the user will be notified if there is a new prescription and diagnosis created. It notifies the user more effectively compared than the notification because taking a cancer patient's medicine should always be on time. The Alarm usually lasts around 30 seconds or until the patient press snooze. This feature is only applicable to the mobile application.

### 5.2 Notification Feature

The notification feature is used in all of the modules. There is an instance when a nutritionist creates a diet plan the patient is notified through their mobile application under the Lifestyle Patient Module. The patient is also notified when they continuously journalize their nutritional intake for the day then the system will generate a summarization report and will notify using the mobile application and on the web based system. On the Medication module a doctor can be notified when a patient journalizes a "patient complaint". Then if a doctor creates a new prescription or requires the patient for consultation the system will notify the patient. If a new diagnosis is made by the doctor the patient will be notified through the web system and

mobile applications. The system also notifies the patient when there is new laboratory, CT scan, radiology results added in the health records.

### 5.3 Appointment Scheduler

The appointment scheduler is used when a doctor have seen that the patient is in need of an appointment based from the information the patient journal such as the patient complaint and diet. When the doctor sees a need for appointment the system can request an appointment for consultation or pick-up of prescription pads by sending an appointment details to the patient that will notify the patient of the details regarding the appointment. If it is a consultation the system will prompt the patient whether the patient will go or not. In case that the patient will go to the appointment, the doctor will be notified of the schedule and details of the appointment based from the patient's respond from the doctor appointment request. The patient may also schedule an appointment with the doctor when the patient sees a need for consultation with the doctor. The patient will be sending a request for appointment and the doctor will be notified with the appointment request of the patient. The doctor will now schedule an appointment with time and details regarding the appointment. The patient will then be notified regarding the scheduled appointment.

### 5.4 Accessibility Feature

The accessibility feature will allow the ease of access of users by allowing the patient to use the system on a mobile phone or use it on a web system. It also allows the doctor and other entities use the system with the use of computer.

## 6. CONCLUSIONS

It is a must for patients to be well-informed of their own health so that they know what to do and take care of their health. Since cancer treatment puts a toll on the patient's body, CHEMIS helps the cancer patient to monitor their own health. Since mobile phones are for personal use, the system runs

on an Android device supported by a web component to maximize the attributes of a mobile phone.

Basically CHEMIS aims to solve not just the main problem, Patient does not properly monitor their health, but also give emphasis on the sub problems.

- CHEMIS aims to resolve manual tracking and monitoring through unconventional ways which in turn creates a problem for the patient itself.
- CHEMIS aims to act as a bridge in keeping track of information especially between the doctors or other professionals that is assigned with their respective patients.

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