

Optimization of resources in Hospitals using RFID for cancer patient

Mr. Sumit Suresh Baperkar¹ , Asst. Prof. Varsha D. Sharma²

¹Student, Dept. Of MCA, Bharati Vidyapeeth's Institute of Management and Information Technology,

²Asst. Prof. , Dept. Of MCA, Bharati Vidyapeeth's Institute of Management and Information Technology,
India

Abstract - This research is an attempt to implement the RTLS (Real Time Location System) in the hospitals which provides the cancer treatments. RTLS system basically used to automatically identify & track the location of objects or people in real time, usually within building or other contained area. Basically RTLS is typically embedded in a product, such as mobile phone or navigational systems Most systems consist of wireless nodes typically tags & badges that emit signals & readers that receives those signals. The cancer is life crises which gives the new meaning to the person's life. According to the most of doctors not only caring about cancer patient but also treatment of such a huge disease is also extremely complex activity, because such treatment involves not only doctors but also multiple clinicians such as nurses, bone marrow transplant coordinators, medical assistants, social workers, pharmacists and many others. As multiple clinicians are involved, it is very difficult to track which treatment should give to which patient and which patient requires the respective medicines because the treatment of one patient also includes the multiple physical resources of hospital. To overcome these kinds of problems in cancer clinics the RTLS technology is used. This RTLS technology is implemented by using the concept of RFID, so it is used to optimize the resources of hospital. So by using this RFID concept it is very easy to keep the track about the resources in the hospitals according to the individual patient i.e. which patient requires what kind of resources depending on their treatments which not only results into decrease in the death rate but it also increase the staff coordination inside hospitals and it will also help to reduce the patient waiting time.

Key Words: Cancer, Patients, Resources, RFID, Tracking

1.INTRODUCTION

According to multiple doctors and medical institutes the caring of the cancer patients is much more Complex activity, as it involves the hospital's staffs and resources and the treatment will be provided on the accurate time. The cancer patient treatment involves the chemotherapy and the pharmacy process, which is nothing but mixing of the various medicines. As this treatment is very tedious and complex, the hospital staffs itself doesn't have any idea about which patient requires which treatment and so on. As the cancer is huge disease, the person who is suffering from it are always in some kind of depression, so it is challenging task for hospital management to handle such types of patients as well as to coordinates all the treatment activities. The main problem with the cancer treatment is arrangement of the mobile resources while conducting an unscheduled and sometimes scheduled appointment treatment. And there is another problem when there is any scheduled appointment gets cancelled then it leads to the wastage of the medicine which is the mixture of the multiple medicines.

Considering treatments of the cancer some of the researchers has given solution about the patients flow inside the oncology clinics/hospitals. The solutions which are provided by the researchers to overcome this patient flow problem are developed with the help of the simulation model techniques.

So in order to overcome the problem of resource coordination and resources tracking problem the technology has given the appropriate solution i.e. concept of the RTLS. The goal of this research paper is to show the way how the technology can be used to tackle such critical problems with the cancer patients as well as the oncology clinics/hospitals' staffs. The Real Time Location System is used to locate the

tagged patients, personnel and equipment's as they are move within the hospital campus. This RTLS technology is implemented by using RFID. The RFID performs the functions as that of the barcode and the magnetic strips back on the credit cards. In order to keep the track of every mobile machineries and gadgets of hospitals the RFID can be used, which will results in the appropriate staffs coordination for treatment, saving the patient's wait time which ultimately results into the decrease in the death rate.

2. LITRATURE REVIEW

Considering the history of cancer death rates in India, there were 555000 people among the total population were died because of this dangerous disease known as cancer, this survey based on some samples of households which were conducted in 2000-2003[1]. According to IARC's Dr Rengaswamy Sankaranarayanan Only half of the estimated 9.8 million death s per year are recorded by the CRS in India, in which 4% are certified by medical and more than 75% of deaths occur at home. In India if we consider top ten death causes, then one of the strongest cause is the cancer. At present, due to cancer there are 0.4 million deaths occurring every year and 2.5 million cancer cases and nearly 0.8 million new cases occurring every year and [2]. Every research paper regarding this cancer incidence and cancer mortality shows the different patient figures, but this is not a major fault because every paper recorded this figures which is almost in the millions. Here is following image that shows the registered cancer cases in India which is divided among the India's top 10 cities [3].

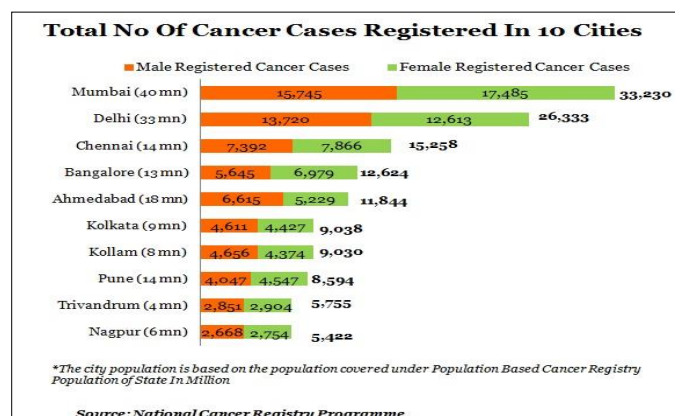


Fig -2.1: Cancer Cases in India

As we have seen the past and future of the cancer patient figures, this situation might be remaining same in the future also. If we consider the future, by the year 2020 India will have Over 17.3 lakh new cancer cases and there will 8.8 lakh deaths because of this cancer [4].

In order to tackle with such a huge disease, the patient has to go from multiple different stages which includes administration of chemotherapy, oncologist visits, lab and pharmacy, this each stages requires multiple resources which needs to be managed by the hospital staffs.

While considering all such stages, uncertainty in one stage leads to its all succeeding stages. All this uncertainty is resolved by using the method of simulation by developing the simulation model which reduces the operational difficulties in oncology clinics up to some extent [5].

Chemotherapy treatment is complex kind of treatment because of it includes highly amount of resources which are in terms of humans, machinery & utensils. So it becomes very complex if any unscheduled appointment is adding on or if any scheduled appointment is cancelled. The Sara Shashaani gave the solution of the scheduling of the workflow in the oncology clinics which is flexible than the current deterministic model [6].

As per the objectives of this research paper the resource tracking in cancer hospital can be achieve by using the concept of RFID, this RFID concept is somewhat similar to the concept of barcode. RFID term stands for the Radio Frequency Identification, it is working with the tags and the reader, in which tags are responsible to store the digital data in the encoded format and which will then have captured or analyzed by the RFID reader. The RFID concept is similar to the barcode, but has more weightage because of its own advantages. The following figure shows the exact difference between the RFID technology and the barcode concept.

Capability/Technology	Bar Code	RFID	RFID Benefit Example
Line of sight requirement	Required	Not required	No need to orientate scanned item
Number of items that can be scanned	One	Multiple	Very fast inventory scan
Automation and Accuracy	Manual read errors and prone to scanning	Full automate and highly accurate	Error free inventory count
Identification	Only series or type	Unique item level	Targeted Racial
Data Storage	Limited Codes	Up to several K8 data	Real time data access in any location

Table -2.1: Difference between RFID and barcode

3. METHODOLOGY

It is conceptual paper secondary data like conference journal paper have been reviewed, various reports have also been reviewed. To understand the how to increase the staff coordination to provide cancer treatments and to reduce the patient wait time.

Working of RFID

By considering this paper, it is the conceptual paper, secondary data like conference, journal papers have been reviewed. The various reports and various blogs have also been reviewed to understand the exact problem of hospital/clinical staffs to provide

the cancer treatment to cancer patient and need to overcome such serious problem so that it will reduce the cancer death rate.

Many of the hospitals who has the major infrastructure always suffers from the coordination among the hospital/clinical staffs, they are also suffers from the problems like improper placement of assets require for the patients as well as for the doctors and hospital staffs. Considering all this mentioned problems within the oncology clinics/hospitals which provides the difficult treatment such as chemotherapy, requires the proper coordination. As the cancer is huge disease, the patient who is suffering from it are always in some kind of depression, so it is challenging task for hospital management to handle such types of patients as well as to coordinates all the treatment activities. The major problems with this kind of treatment are the resource tracking and the wastage of the medicines. Resource tracking is majorly requiring to make the proper coordination in the chemotherapy treatment. Some oncology clinics/hospitals makes the medicine which are require after this chemotherapy treatment earlier, so if any appointment gets cancelled on same day so it will lead to the wastage of the medicines.

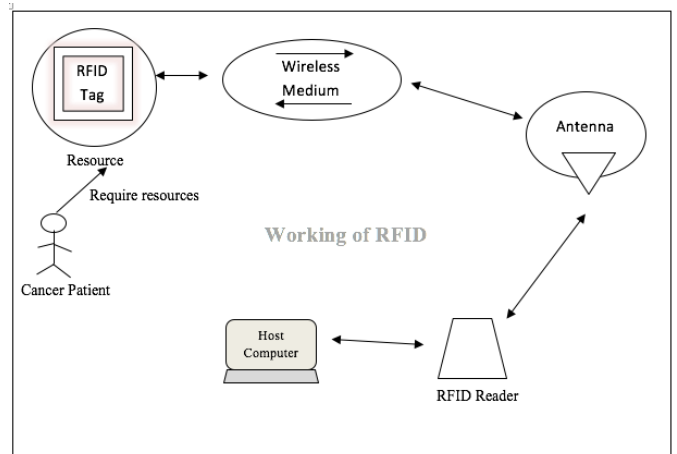


Fig -3: Working of RFID

As specified in the literature survey this problem can be resolved by using the concept of RFID, stands for Radio Frequency Identification. RFID is the technology into which the digital data is converted or encoded into the RFID tags which are then captured by the RFID reader. Basically the RFID consist of the three parts such as RFID tags which is also called as

smart labels, an antenna and RFID reader. According to the figures which we have shown in in the fig 2.1, this research is basically for the hospitals/oncology centers which belongs from the Metro cities of India, because if we look into that graph the number of cancer patients are more in the all-metro cities of a India. And there is another reason also to implement this concept into metro cities that this concept can be easily implement into the hospitals in the metro cities because Hospitals in the rest part of the India is still not equipped with all the resources and network capabilities.

RFID is belonging to the group known as AIDC i.e. Automatic Identification and Data Captured, The RFID tags contains the integrated circuit and an antenna which is responsible to send the data to the RFID reader which is also referred to as an interrogator. The RFID reader then converts this radio wave signals into the more usable form of data. This information is then transfer to the host computer where the data is stored in an appropriate format inside the host computer system which the use for the analysis purpose [9]. This RFID reader can be placed at the strategic places such as Hospitals entrance and exit and in operation theatre doors and hospital staff should be equipped with the RFID reader with the wireless connection such as Wi-Fi [10]. So with respect to working of this concept with cancer patient's treatment this RFID tag is attached to the mobile resources which are require for the chemotherapy and that tags are also provided to the patients which contains the patient's basic and his/her treatment information. So it will help the hospital/clinician staff to make the arrangement of all the resources for a particular patient, so that the treatment will not take the large waiting time for making the arrangements of resources and if any unscheduled appointment occurs then also with help of this RFID concept the person's treatment information is fetched and particular arrangements can be make. Another problem with the cancer patient is that, if any scheduled appointment gets cancelled, then there is a waste of medicine which are created by mixing multiple medicines, so if any of the patient's whose not able to come on the time of the appointment then the information about that patient is not going to update, accordingly the staff will not make the medicine for that patient which overcomes the problem of the wastage of the medicines.

As this RFID concept works in the wireless environment i.e. it works in the electromagnetic field the next question might arises of the, is radiations of RFID Harmful to Human Body?. The answer to this question is that it quite hazardous if when RFID tags and Reader is close to the eyes and it should hazardous to the patient if the distance between RFID tags and Reader with the eyes is less than 1.6 feet i.e. 0.5 meters[11]. The figures which we have plotted above regarding the distance are looking very small, but if we cannot ignore it, even if it is lightly hazardous to the patient but the EMF i.e. electromagnetic radiation exposure of RFID is less than our home electronic products such as cordless phone, microwave oven, TV and Wi-Fi routers[12].

6. CONCLUSIONS

There are two major problems with the oncology clinics/hospitals one is that sometimes the patient has to wait for some time until the resource required for his/her treatment is get available that resources are unavailable due to many of the reasons such as not finding particular resource or any treatment of any unscheduled appointment is going on. The another problem is cancer treatment requires medicines after their treatment and that is the mixture of multiple medicines, so sometimes the scheduled appointment gets cancelled that leads to the wastage of such medicines.

Many researchers have found the solution for the patient flow inside the oncology clinics/hospitals by using the simulation techniques which reduces the patient's unnecessary waiting time. But this RFID gives the solution for the problems of cancellation of scheduled appointment and addition of unscheduled appointment.

This RFID concept is responsible for storing the data about the location of mobile resources and also the patient's requirements into the host computer, it's become very easy for hospital staff's to conduct the treatment without patient's waiting time. So that every patient's gets the treatment on scheduled time there is no wait time in the patient's treatment which is ultimately reduces the death rate of the cancer patient.

REFERENCES

- [1] Indian cancer statistics, a model to be followed.
- [2] Online Reference:
<http://www.who.int/cancer/modules/India.pdf>
- [3] National cancer registry programed.
- [4] Online Reference:
<http://icmr.nic.in/icmrsql/archive/2016/7.pdf>
- [5] Improvement of chemotherapy patient flow and scheduling in an outpatient oncology clinic by Bohui Liang
- [6] Chemotherapy patient scheduling and uncertainty
- [7] Cancer clinics nation wide enhance the patient experience with real-time workflow technology by versus October 21,2015.
- [8] Online Reference:
<https://msdn.microsoft.com/en-us/library/aa479355.aspx>
- [9] RFID Design Fundamentals and Applications Book by Albert Lozano-Nieto
- [10] How do RFIDs work in Hospitals? RFID Technology: A Case Study.
- [11] Online Reference:
<http://www.rfidjournal.com/blogs/experts/entry?5001>.
- [12] Online Reference:
<http://galecia.com/blogs/lori-ayre/library-rfid-and-health-effects>.