



ROLE OF INFORMATION TECHNOLOGY IN HEALTH SECTOR TO IMPROVE HEALTH CARE IN INDONESIA

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ABSTRACT

Number of population is rapidly increasing each year. This condition generates many problems in many sectors including health care. In developing countries like Indonesia, the ratio between number of population and health care facilities has never reached an ideal number. Some problems such lack of transportation infrastructure in rural areas, consists of many islands and lack of health information that distributed well in rural areas are facing by Indonesia government nowadays. Some improvements are needed to enhance health care. The use of information technology is one of the solutions to enhance health care. In many rural areas, telecommunication infrastructures have installed already. New features and technology are always offered by the telecommunication provider. These features and technology could be used to facilitate the resident to obtain proper health care. Some health care services could be conducted using this technology. For instance sending medical records of patients and sending medical images to the health care provider. The presence of information technology is required to give an appropriate health services to the communities.

Keywords: Information Technology, Healthcare, Services

INTRODUCTION

Information technology is an essential element in the life of the nation. The role of information technology in human activity at this time is so enormous. Information technology has become the main facility for the activities of the various sectors of life which contributed greatly to the fundamental change in the structure of operation and organizational management, education, transportation, health and research. Roles of Information Technology at the present time are not only used for the organization, but also for individual needs. Organizations can use information technology to achieve a competitive advantage, whereas for individuals, the technology can be used to achieve personal advantage including finding a job.

Any work performed more or less rely on existing technologies. Nowadays, the information technology makes daily activities easier, including Health Sector. Right now, Information Technology in Health has a extremely

significant role to help the human as well as research in the field of medicine. Information technology is used to analyze human organs which is hard to see, to diagnose the disease, to find the right medication to treat the disease, and many more. However, in its development, there are still obstacles for example about geography and educational differences that allow less optimal quality of health services. Therefore, people need an introduction about the information technology used in the field of health in order to ease access to effective health services, include improving the quality of medical in Indonesia. It can be concluded that the information and communications technology (ICT) will be needed by the community in order to facilitate the smooth running of health services.

The introduction of information technology is an essential to to improve the health services, thus improving the quality of public health in Indonesia. Use of IT in healthcare is one perfect solution to solving health care problems in Indonesia. At least the use of IT in health

services in Indonesia will solve the problem as follows:

1. Geographical problems, time and social economical Indonesia. The Republic of Indonesia is an archipelagic country, tropical and mountainous regions. This will influence the development of health services infrastructure that can lead to distribution of information. Reduce the lag in the use of IT in health care compared to developing countries and other developed countries.
2. Acceleration of equal opportunity services and improving quality of service that is difficult to overcome by conventional means. The handling of a need for more efficient coordination between health care units where patients were diagnosed to places where the patient will be referred to the care unit can more precisely and efficiently (Irawan 2006 :3). Improving the quality of human resources through the development and utilization of IT. IT will help the performance of health services in an integrated manner so that it will materialize effective management and efficient, transparent and accountable.
3. The geographic and socioeconomic Indonesia, application and development of IT will be the backbone of the future of health care system. TI utilized and developed to be able to raise the dignity and human values with the creation of health care that higher quality and more efficient, so as to meet human needs in this global era. Application and development of appropriate IT applications in health care is one of the key factors essential to keep pace with the world of education and the quality

of human resources (HR) Indonesia with other nations.

Improvements continue to be made in response to the demands of the development of information, science, technology, art, demands decentralization, and human rights. Various circumstances indicate that Indonesia has not been able to leverage the potential of IT as well, and therefore Indonesia threatened the digital divide (digital divide) which continued to lag behind the developed countries. Infrastructure gaps and telecommunications facilities and information among cities, the countryside, the mountains and the coast, county and even inter-island province also widen the gap so that there is also a digital divide in our own country.

The development of Information and Technology in Health

Standards and quality of health services in Indonesia has not been encouraging and are still lagging behind when compared to other countries. Attention to the state standard of health facilities for health care providers and their effects on patient outcomes is still lacking. To fix the national health system, it needs progressively a clever solution in the form of e-service health or commonly referred to as e-Health, which is an enterprise solutions in the field of health as it involves various parties, ranging from the wider community, hospitals, health centers, universities, to drugmakers and the pharmaceutical industry. Besides the integration and integration between e-Health with *SIAK (Population Administration Information System)*, both on a national, regional and local very helpful optimizing public health system in the future. *Process*

Digital Medical Records (DMR) or electronic medical records is a fundamental segment of e-Health.

Because DMR facilitate data exchange between medical institutions such as hospitals, health centers, universities, individuals and others. The system can store the history of a patient's medical records from birth to death. The advantages of electronic medical records, among others are allow simultaneous access from different locations, reduce errors of interpretation and presentation of varied, accelerate decision-making, and help analyze the data. These conditions are perfect if accompanied using multimedia storage capacity for x-rays, sound recordings, diagrams, pathology reports, and others. E-Health applications spawned tremendous leap in the health sector such as: Epidemiological Surveillance, Telemedicines, prescribing and *Geographic Information System* (GIS).

To develop e-Health applications importance of considering the standard DICOM (*Digital Imaging and Communications in Medicine*), because the standard allows data to be stored radiology examination results and or transmitted using a particular format. DICOM standard coverage does not just revolve around storage and data presentation radiology, but growing towards integration with the radiology instrument specific protocol communications network

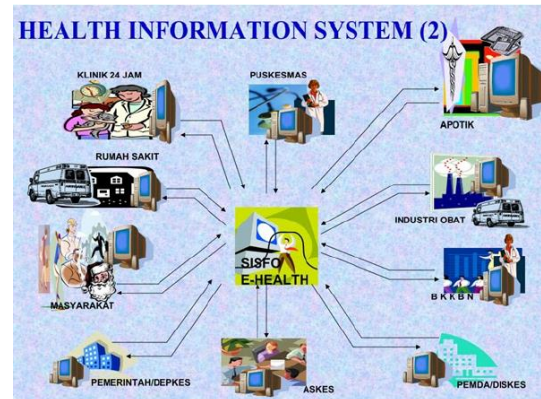


Fig.1 Information Technology in Health Sector has Developed Today (Sofyan Jalil, 2005)

Benefits of Information and Technology in Health

As described above, the role and computer applications in the health field are numerous. Computer has indirectly helped people to know the disease up until the stage of healing. In conclusion, the benefits of the application of computers in the health field in each application are as follows:

1. Diagnosing an illness and prescribing appropriate drugs.
2. Viewing and analyzing organs of human.
3. Monitoring the status of the patient and medical history of patients.
4. Conducting the necessary scientific research.
5. Easily entering, storing, clustering and processing data
6. Detecting a person's DNA
7. Checking and getting results of blood tests in the laboratory
8. As a tool in medical examination

In essence, the presence of computers in the field of health is very helpful. Activities that previously could not be done, can now be done with a computer. The use of computers to make

someone's job easier, faster and accurate, such

1. rotgen against the patient's body so that it can be seen what the disease and its causes.
2. Diagnostic, treatment and care, monitoring patient status
3. Hospital administration
4. Data base of employees
5. Laboratory analysis of health research
6. Research and Pharmaceutical factory.

The development of information technology has penetrated into various sectors including health. Although world health (and medical) is a field that is information-intensive, but the adoption of information technology is relatively underdeveloped. For example, when the electronic financial transactions has become one of the standard procedures in the banking world, the majority of hospitals in Indonesia just in the planning stages billing system development. Although the hospital is known as a capital-intensive, but the investment in information technology is still a small part.

In addition to having the potential to filter and process the data into information, IT is able to save the amount of capacity far more than manual methods. Convergence of communication technologies also allow health data to be shared easily. In addition, the technology has the characteristics of very rapid development. Every two years, there will be new products with processing capability that is twice as fast and twice as much storage capacity as well as many new innovative applications.

Application of information technology to support health information management

1. Medical records based on a computer (computer-based patient record)

One of the major challenges in the application of information and communication technology in the hospital is the medical application of computer-based medical records. In his official report, Intitute of Medicine notes that it is still little evidence of the successful implementation of computer-based medical record as a whole, comprehensive and can be used as a data model for other hospitals.

Definitions of computer-based medical records are vary, but in principle, is the use of a database to record all medical data, demographic and every event in the management of patients in hospitals. Computer-based medical records will collect a variety of patient clinical data, both derived from the results of the doctor's examination, digitization of the appliance of diagnostic (EKG, radiology, etc.), the conversion of laboratory test results and clinical interpretation. Computer-based medical record complete with amenities usually accompanied *decision support system* (DSS) that enable delivery of alerts, reminders, diagnosis and therapy in order to help doctors and clinicians can adhere clinic protocol.

ICT also makes it easy to doctors and nurses to monitor patient health, monitor the patient's heartbeat through a computer monitor, blood flow, checking organs in patients with X ray. With modern technology can monitor, even replace the function of internal organs such as the heart, lung and kidney. It is a health technology combined with Information and Computer Technology.

2. Medical and Non-Medical Services

a) Medical Service

Services that are medically, especially in nursing services has developed information technology is helpful in the nursing process begins of entering data digitally to a computer to facilitate the assessment later, what interventions are consistent with the diagnosis yan already established previously, to the output of what to expect by nurses. Before implementing this system the first thing to do is standardize the classification of nursing diagnoses during this time it is still ambiguous, this is done to remove the ambiguity in the documentation and provide further benefits to the system of compensation, scheduling, evaluation of the effectiveness of interventions to the identification of errors in nursing management. This system makes it easy to monitor the client and the nurse can immediately incorporate the latest data and what interventions have been carried into the computer that is already available in each ward so that will reduce errors in the documentation and evaluation of the results of nursing actions that have been carried out.

b) Non-Medical Services

Services that are non-medical field with the development of information technology are like now more helpful in providing a form of service that is more efficient and effective, where prospective clients a hospital that once treated or treated in hospital no longer need to wait in a long time when registering for the administration process is still documented manually on paper and require considerable time searching for client data that is stored, or after a long time searching for and not found the end the client is required to register, again, and it

clearly lowers the efficiency of the hospital in the use of paper which would require a fee. Compared if every client is registered digitally and all data on the client entered into the computer so that when the data required can be taken back by the relatively short time and accurately.

Role of Information Technology in Health

Information technology in health or medical computers has also demonstrated a very significant role to help the human soul, and research in the field of health. Computers are used to diagnose the disease, finding the right medication, and analyze of human organs which is difficult to see inside.

Technologies have been developed in the field of health are as follows:

1. System *Computerized Axial Tomography* (CAT) is used to draw the structure of the brain and take pictures of all the body parts that do not move by using X-rays. As for the move to use the system *Dynamic Spatial Reconstructor* (DSR), which can be used to view images from various angles organs. DSR commonly known as CAT and CT scans.
2. *Single Photon Emission Computer Tomography* (SPECT) is a computer system that uses gas to detect radioactive particles that the body shown in the picture. Another form is the *Positron Emission Tomography* (PET) is also a computer system that can display images using radioactive isotopes. The development of PET-SCAN can not only detect cancer, but can also be used in other medical fields.

So, with the development of technology in the field of health is to help those engaged in the field of health to do their job. They can quickly handle the patients, could diagnose their disease, and possibly one of diagnostic that may already frequent in the field of medicine that bring death can be reduced. Utilization of Information Technology is increasingly supporting the improvement of the quality of work in the field of medicine, because of the increasing sophistication of the technology.

Currently there are new findings that a DNA computer, which is able to diagnose the disease while providing medication. Ehud Shapiro and his team from the Weizmann Institute of Science, Rehovot, Israel, has made a DNA small ultra computer for diagnosing and treating certain cancers. Computer components of DNA is the genetic material of known sequence of alkaline. As it is known that the gene sequence is intrinsically has the inherent ability to process information like a computer. Therefore trillions of biomolecules engine that works with more than 99.8% accuracy, it can be packaged in a drop of the solution. Computer nucleotide strand DNA using as input data, and active biological molecules as a data solution can generate a logical control system of biological processes.

In the health field, the computer is very important. The use of computers in the health sector will not only benefit the users, but also by the organization, in this case such as hospitals, health centers, clinics, and others. These devices can indirectly help the human spirit.

Computers can be used from storage and processing of administrative data in a hospital or clinic, to do research in

medicine, diagnosing diseases, finding the right medication, and analyzes of human organs is difficult to see inside.

The role of computers in the health sector are many and important. For example in the health sector including:

1. Field of administration

With the advent of computers in the world are very helpful in the administration of storage, clustering, and data processing. Without the computer, it will be extremely difficult to check how much patient data, drug stocks, and other data owned by the hospital. But with the computer, check the patient data, stocks of medicines and hospital financial data also will be easy and practical to do. With the use of computers and a sophisticated system in it so much easier course of a system in the hospital.

2. Pharmaceutical Sector

In the field of drugs, computer is also very important role in the pharmaceutical, eg. for prescription and dosage is recording, and keep a record price of the drugs. In addition, with the advent of computers in the pharmaceutical field also help to categorize the various drugs based on their usefulness, such as Panadol, Feminax, Ponstan are painkillers.

3. Diagnose a disease

With the DNA computer that has been specially designed in the health field to diagnose an illness not a difficult thing anymore, because by using the computer more quickly, easily and accurately to determine the name and type of disease.

4. Monitoring the status of the patient

Patients who had come for the first time or treatment will be easily tracked. Personal data of patients can also be seen easily. In addition, doctors and nurses can view the records check results,

complaints and previous disease history that ever suffered by the patient, the date of arrival of the patient last treatment, prescription records ever given, and many more.

5. Research

Scientific research in the field of health is very dependent on the use of computers. The use of computers can maximize the results of research, because with a computer that can trace its research deeper and more detail. For example a study to detect bacteria or a new virus, the detection of DNA, and so forth.

6. Viewing and analyzing organs of human

To be able to see internal organs in humans have been found so many powerful tools, but almost all of these tools still rely on computers as a means for transmitting data or drawing. Therefore, the computer has a vital role also in view and analyze organs of the human body.

7. The role of the others are:

- a. Medical Records of patients
- b. Patient information
- c. USG (Ultrasonography). USG is a diagnostic imaging technique using ultrasound is used to image internal organs and muscles, their size, structure, and wound pathology, making this technique useful for checking organs. Obstetric sonography is commonly used when a pregnancy.
- d. Implementation of diagnostic or therapeutic procedures can be performed with the aid of ultrasound (eg for biopsy or removal of fluid). Usually using the handheld probe which is placed on the patient and driven: aqueous gel ensure

harmonization between the patient and the probe.

Given the rapid development of information and communication technology is quite rapid, community medical records need to understand the concept and application of medical informatics (medical informatics). Medical informatics (sometimes called health informatics) is a discipline that is involved closely with computers and communication and utilization in medical circles. In a more detailed sense, the discipline that is evolving rapidly dealing with storage, withdrawal and use of data, information, and biomedical knowledge optimally for purposes of problem solving and decision making. Therefore, bio informatics in contact with all the basic and applied science in medicine and is intimately intertwined with the modern information technology, namely computers and communications. The presence of medical informatics as a new discipline which is mainly caused by the rapid advances in communications technology and computers, raises awareness that medical knowledge is essentially will be unable managed (unmanageable) by paper-based method (paper-based methods). The scope of medical informatics study covers the theory and applied. Thus, it can be said that medical informatics is a discipline of its own.

In the applied medical informatics applications include electronic medical records, medical decision support systems, information retrieval systems of medicine, to the use of internet and intranet for the health sector, including the weave clinical information system with internet-based bibliographical searches. Thus, community medical records will have extensive knowledge about the prospects for

information technology and capable of bridging clinicians (users and a major provider of health information) with computer scientists (informatics) that aims to visually design applications and systems in order to produce information management applications health hospitals more effective and efficient (Anis Fuad, 2005)

CONCLUSION

The use of information technology in health care can improve employee productivity in service to the community members. The role of information technology in health care and it can increase work productivity with a high degree of accuracy, speed and high usage. Information technology is needed to solve the problems faced by the community. To fix the national health system is progressively takes a clever solution in the form of e-service health or commonly referred to as e-Health, which is an enterprise solutions in the field of health as it involves various parties, ranging from the wider community, hospitals, health centers, universities, to drugmakers and the pharmaceutical industry. Activities that previously could not be done, can now be done with a computer. The use of computers to make someone's job easier, faster and accurate. The development of technology in the field of health is to help those engaged in the field of health to do their job. They can quickly handle the patients, could diagnose their disease, and possibly one of diagnostic that may already frequent in the field of medicine that resulting in death can be reduced.

REFERENCE

Anis Fuad. 2005. Peran Teknologi Informasi untuk Mendukung

Manajemen Informasi Kesehatan di Rumah Sakit.

Irawan, Yoke S., Koesoema, A.P., Soegijoko, S., *Organizational Readiness in the Implementation of Internet Based Community Telemedicine*

Jogiyanto HM, *Pengenalan Komputer, 1992*

Jogiyanto HM, *Analisis & Disain Sistem Informasi, 1999*

Kadiman, Kusmayanto. 2006. *Buku Putih- Penelitian dan Penerapan Ilmu Pengetahuan dan Teknologi.* Jakarta. (Modul)

Koesoema, A.P., Irawan, Yoke S., Soegijoko, S., *Preliminary Design of a Community Telemedicine for Disease Surveillance & Outbreak Management, accepted at Medetel 2006, Luxembourg 2006.*

Koesoema, A.P., Irawan, Yoke S., Soegijoko, S., *Preliminary Design of a Community Telemedicine for Tuberculosis Control, accepted at World Congress on Medical Physics & Biomedical Engineering 2006, Seoul, 2006*

Laudon, Kenneth C, and Laudon Jane Price (1998), *Information System and the Internet, A Problem Solving Approach, 4th Eds, Sydney, Dreyden Press*

Mcleod, Raymond. *Management Information System, Seventh Edition, 1998.*

Shore, Barry. *Instruction to Computere Information Systems, 1995.*



Sofyan Jalil, 2005. Teknologi Informasi untuk Kesehatan Sebagai Komunikasi Informasi efektif bagi Daerah. Simposium Nasional. Jakarta 23 Agustus 2005.

<http://mahanirosyidha.blogspot.co.id/2013/05/pe-ngenalan-ict-information-and.html>

<http://id.shvoong.com/medicine-and-health/medicine-history/2065852-manfaat-komputer-bagi-bidang-kedokteran/>

<http://deni2k6.wordpress.com/2011/01/01/fungsi-komputer-di-dunia-kedokteran/>

<http://myblogginformasiteknologi.blogspot.co.id/>