Computer Based Information System for hospitals At a glance

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Information is the life blood of the organisation… -Goel

Abstract - This article reviews the bird's eye view of the need for information system in hospital. Hospitals are concerned with most vital aspects of human life. The goal of hospital is to provide best possible patient care. To achieve this goal a hospital has to utilise its resources wisely. Every organisation receives inputs, transfer these inputs in an effective and efficient manner to produce outputs. This transformation carried through planning, organising, staffing, controlling and communicating. All these functions of management are interwoven and interrelated. It is therefore essential that managers are equipped with adequate, appropriate and real time information that can be utilised for effective decision making in the organisation. Vital to all these functions is information system that is utilised for performing all the managerial functions. Information is something that people need to know and apply in their work to achieve their objectives. The method that converts data into information is known as information system. Information has already been recognised as the fifth resource of an organisation in addition to men, machines, materials and money. Ninth plan suggested developing a good hospital management information system for effective policy planning. A blend of quality improvement programmes, management techniques with adaptation of information and communication technology would enhance the service delivery and profit of the hospitals.

Keywords: Computers in hospitals, Information system, CBIS, Healthcare management, HIS– Hospital Information System, E-healthcare

I. INTRODUCTION

In recent years, the demand for better health care due to improved socio-economic and other conditions has increased sharply. This has resulted in widening of gap between availability and the demand for health care in India. To bridge this gap, the solution lies in considering hospital as a complex system where its components interact with each other to achieve the goal of providing best patient care. The information and service links connecting the triad of patient, nurse, doctor with administration and support functions. According to ramaiah, to understand flow of information in hospital environment, it is essential to view hospital as a system comprising of many subsystems. Hodgetts, in examining modern organisation structures observed that health care institutions are made up of interrelated and inter-dependent parts and one part or subsystem cannot perform effectively without the other. The complexities of modern organisations demand new dimensions in modern management. Perhaps, the most profound and promising of these dimensions is the emerging utilisation of computer based information systems. It will help the organization to function in an efficient manner.

II. INFORMATION SYSTEM

Information system is a set of organised procedures which when executed provides information to support decision-making. It is a network of steps to collect and transform data into information. A series of nine basic steps are in an information system. These are classifying, collecting, recording, sorting, calculating, storing, retrieving, reproducing and communicating. Information technology is the name given to amalgamation of computers and communication technology.

How information system works

Fig.1

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Computer Based Information System (CBIS)

Though information systems have been in existence in organisations for time immemorial, yet a fresh impetus to them has been given by the introduction of computers. Faster access to voluminous data at a lower cost is facilitated by the computers. The basic management functions of planning and control now mostly depend on access to CBIS that makes the decisions-making more structured.

CBIS is a computer- based information system, uses computers to collect, process, store, analyse and distribute information for a specific purpose such as meeting a business objective.

Need for CBIS in hospitals

- Increasing health consciousness among the public
- Limited resources
- Rapidly rising healthcare cost
- Fast raising population and inadequate skilled manpower
- Rising people expectations about quality of care
- Increasing awareness about rights through enhanced scope of consumer protection act

Major components of CBIS

- Computer hardware -the physical equipment used in the gathering, entering and storing of data, the processing of data into information and the output of the resulting information, i.e. central processor, random access storage devices, input/output devices;
- Computer software-the set of programs used to operate the hardware and to process data into information and a communication network;
- Database-the data stored in data bases;
- Procedures-the set of instructions or rules that are used to direct information system activities, for example, to control access to computers and outline backup activities; and
- Personnel -who use and operate the information system

Advantages of CBIS

- Exceptionally high speed in data handling
- Less duplication of effort in the maintenance of data bases
- More accurate data as sources of error are reduced
- Better communication within the organisation since everyone has access to the same information
- Information can be secured from unauthorised access
- Coordinated approach to the information needs of the organisation

Types of CBIS

The types of CBIS defined by various authors such as Kroeber and Watson and David are: transaction processing systems, management information systems, decision support systems, office automation systems and executive support systems.

III. INFORMATION SYSTEM PYRAMID

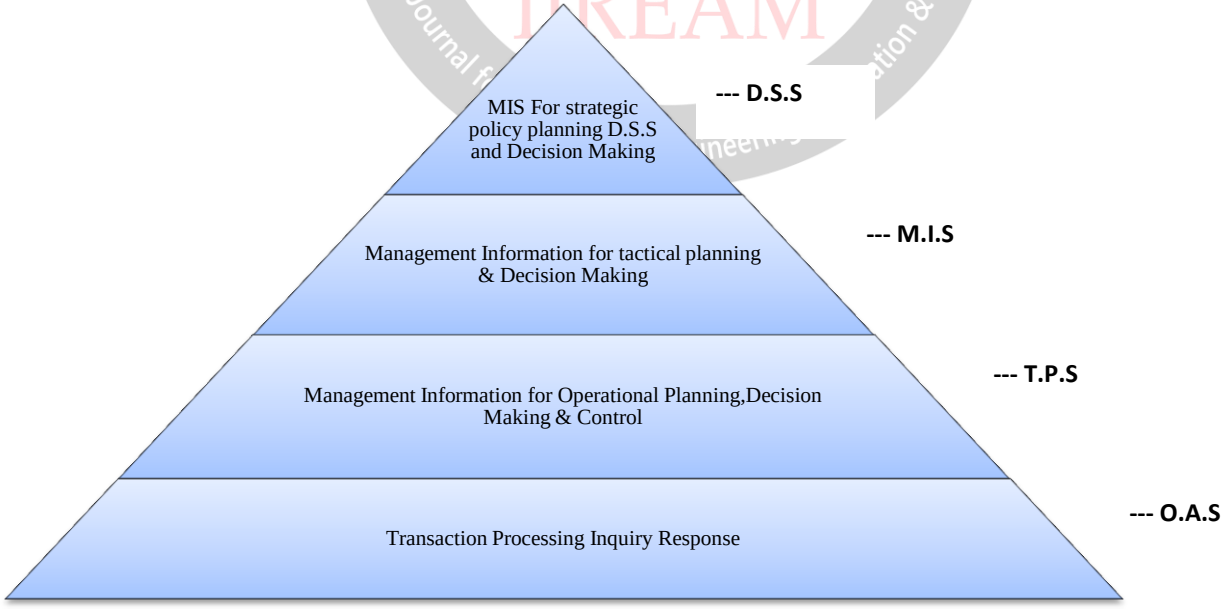

Fig.2

Transaction Processing Systems (TPS)

A transaction processing system is a computerised system that performs and records data about routine events or transactions necessary for the running of organisation and therefore serves the operational level of the organisation.

For example, if a patient is admitted, the TPS would ensure that the admission was posted in the admission register/file

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and later when the patient is discharged to the discharge and billing file of the patient and the history file. Output would be a printed list of detailed daily and monthly statements for patients on various factors.

Decision Support Systems (DSS)

DSS are systems that assist in making decisions that are semi-structured, unique or rapidly changing and cannot be specified in advance. DSS are prevalent at tactical and strategic levels where the risk of making an error is high. DSS use models, which describe the interrelationships between the important variables in a particular environment, and allow the manager to explore answers to questions based on what-if analysis. These are area specific e.g. financial DSS, marketing DSS, etc.

Executive support systems (ESS)

ESS assists top level executives in the acquisition and use of the information for managing the organisation. It combines the power and data storage capacity of an information system with the ease of use and graphics capability of a personal computer (pc). Eg. A hospital administrator may wish to compare patient turnover data with previous years in a tabular or graphical form.

Office automation system (OAS)

OAS is information systems that creates, store, modify display and communicate office correspondence in written, verbal or video form. It includes e-mail, fax, stand alone word processors, video-conferencing, etc.

Management information system (MIS)

MIS provides the managers with information about the activities they need to take decisions.

- MIS applies to all management level
- It has and is linked to an organisational subsystem
- It function to measure performance, monitor progress and evaluate alternatives and
- It is flexible both internally and externally

Expert systems This is the latest addition to this category and makes use of artificial intelligence techniques to solve problems. Experts are valuable to an organisation because of their knowledge that they possess in specific domain of working. Due to this, they are few in number, are expensive and may be difficult to replace.

An expert system also known as knowledge base system (KBS) is a computer based program which contains a set of facts about a specific domain of human expertise and by manipulating these facts intelligently, according to rules of inference or heuristics it is able to act as a consultant in that particular field. Expert systems usually focus on a very narrow area and perform tasks that are relatively unstructured. They store facts and rules, known as their knowledge base, which mimic the decision-making processes of a human expert.

IV. SYSTEM CONCEPT

A system is a set of interrelated and interdependent parts designed to achieve a set of goals. The hospital is assumed to be composed of a number of information nodes in a data flow diagram, each node of which requires inputs, performs some processing and generates outputs. The nodes are chosen in a way that assists in understanding the functions of the hospital while preserving its usual internal relationships.

Components of a system

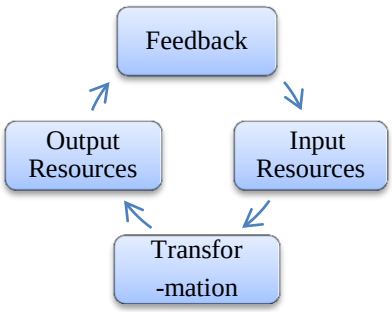

Fig.3

The coordination among these subsystems is essential for smooth functioning of hospital as a system. The basic components of a hospital system continuously act and interact with one another to render medical care service that can be termed as the 'output' resulting from certain 'inputs' fed in to the hospital system.

Hospital and its sub-systems

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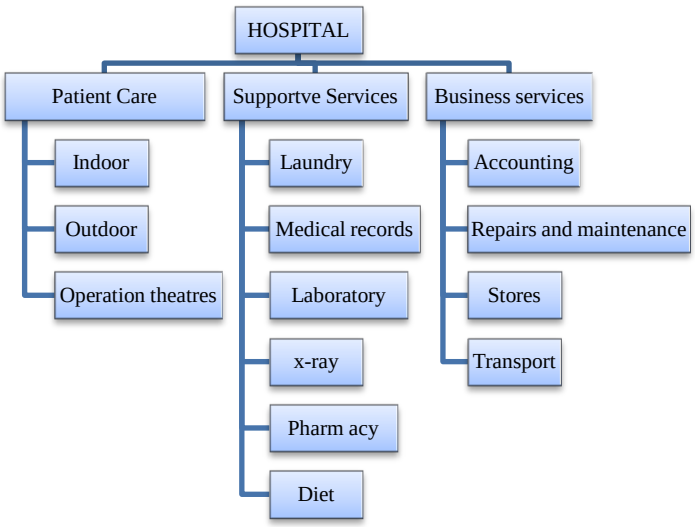

Fig.4

There are eight information subsystems in a hospital according to Gillette et. Al.

1) Patient diagnosis and treatment system that includes information derived from such hospital departments as clinical labs, pathology, radiology, pharmacy, etc
2) Patient record system that involves departments such as medical records, admissions and insurance in addition to above departments
3) Patient scheduling and order system that include all patient care departments and support services such as dietary and housekeeping
4) Patient accounting system that includes most of the above plus accounting and credit and collection offices.
5) Expenditure and general accounting system that includes budgeting, payroll and materials in addition to patient service departments
6) Personnel system of employee and position information.
7) General supportive services system that includes such departments as industrial engineering, data processing and plant management
8) Management control system that runs through all systems for effective and efficient management

V. APPLICATIONS

Computers are used in the following areas of healthcare,

- Strategic planning
- Enterprise resource planning
- Medical and patient data
- Medical imaging and equipment
- Patient monitoring
- Hospital statistics
- Communication and telemedicine
- Inventory
- Research etc,

VI. SUMMARY

The need for information is constantly growing in almost every sphere especially with its easy access made possible by advances in computers and communications and the so-called "information superhighways'' which have really converted the entire world into a global village.

Management uses relevant information to prepare plans, control activities and make decisions. Relevant information increases knowledge, reduces uncertainty and is useful for the intended purpose. Information can increase the probability of making right decisions.

The complexities of a modern hospital demand new dimensions in management techniques that have so far been run on conventional approaches to decision-making, i.e. judgment intuition, experience, etc. The present day hospital is thus seized with an "information explosion". To cope up with this explosion of information the hospitals in other countries made increasing use of computers for information storage and retrieval. This trend is now being adopted by hospitals in India, with the private sector and the corporate hospitals taking the lead. A well-informed public expects medical care of high quality which hospitals are unable to provide. Also the cost of providing high quality care is enormous for the hospitals with insufficient budgets. In the last few years there have been significant changes increasing affluence, new purchasing power from private and public insurance plans (medi-claim, arogya, lic jeevan shri, etc.), more health education and consciousness and increasing urbanisation contributing in escalation of demand for better health care. The day-to-day operations of a modern hospital involve handling of vast quantities of information such as registration, admissions, laboratory tests, discharges, deaths, births, transfer etc. Multiplicity of hospital functioning leads to information flow that is highly variable in content, format and importance. Further the hospital administration is least effective and deficient because of the overburdened resources and facilities. To

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add to the problem of overcrowding, there is a voluminous paper work to be handled which often means non-availability of patient- related data in time. This leaves little time for patient care. There are delays in getting test results and in the preparation of bills. Medical research is hampered as data cannot be stored and easily analysed.

Although computers can play a significant role in hospitals yet hospital management is reluctant to adopt them because of variety of reasons and misconceptions about computers. Nevertheless the wise and careful use of computer technology can help hospitals maintain quality of care while managing costs in today's highly competitive environment. The rapid availability of complete information can improve the earlier diagnosis, speedup treatment and reduce the patients' length of stay in hospitals resulting in savings in hospitals expenses. Therefore, all functional areas of the hospital such as laboratory radiology pharmacy nursing medical records, etc. Should be inter-linked so that data entered into the system from any of these points may be accessible and used by all concerned personnel.

The use of computers in hospitals has led to a remarkable change in the style and functioning of the hospitals in advanced countries like usa, japan, uk, etc. According to survey reports of American hospital association about 86% of the American hospitals use computers. Though this stage has not been reached in India, the day is not far when most Indian hospitals will also make use of computers like the hospital in the developed countries.

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