

**REVIEW ARTICLE****Business Intelligence Role in Improving Healthcare System: A Conceptual Model**

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*Department of Computer Science and Application, Mandsaur University, Mandsaur, Madhya Pradesh, India***Received on: 29-01-2025; Revised on: 07-02-2025; Accepted on: 08-03-2025****ABSTRACT**

In the current time of genuine business conditions as a result of growing complicated nature and globalization, administrators and specialists/doctors have started to improve organizations for customers, especially in clinical administrations and health organizations. Health organizations are important because this is the only point of care for so many people, offer admission to a particular problem, and many more. The present healthcare services schemes are moving from volume-based business into esteem-based business, which requires an exhaust from specialists and assistants to be more profitable and effective. This will improve medical services work on, changing the individual way of life, and driving them into a longer life. Administrators and specialists are confronting a developing interest for both clinical and supervisory data to agree to legitimate and client-explicit prerequisites. The computer-based business intelligence tool is very helpful and convenient in the decision-making process and definitely improves the healthcare organization. In this paper, two conceptual models for doctors and patients have been designed for the improvement of the healthcare system.

**Key words:** Business intelligence, computer-based business intelligence, decision-making, health industry, healthcare organization, healthcare system

**INTRODUCTION**

The healthcare system in India incorporates hospitals, nursing homes, multispecialty clinics, medical centers, medical care suppliers, diagnostic centers, pathology labs, paramedical staffs plus Ayurveda, Homeopathy, Unani, Naturopathy, Siddha, and Yoga institutes.<sup>[2]</sup> Hospitals, Clinics, and Nursing Homes give essential primary care to patients and referral foundations when required for a higher level of care.<sup>[4]</sup> The evaluation of proficiency in healthcare services can help the administrator or manager in the decision-making process to ensure the optimal utilization of services and resources available.<sup>[6]</sup> Apart from the administration offices of government or government hospitals, a critical piece of medical care services is handled by private hospitals. As of now, the private segment conveys around 80% of all outpatient care and around 60% of all inpatient care. Hospitals or clinics administrator,

who is bound to give medical services benefits at a satisfactory degree of value and minimum cost.<sup>[4]</sup> Operational attributes of the working environment could likewise impact the nature of care, through an impact on the work process and simplicity of activity to the undertakings being finished. Physical situations that spot required new technology and innovation inside simple access of the medical care specialist and the patient may have a huge effect on the nature of care gave by the medical services specialist.<sup>[5]</sup>

It has been discovered that the computer-based business intelligence (CBBI) tool or software is very powerful in a specific decision-making process. The issue of a real and intelligent assistant in decision-making and organization-wise decision support system (DSS) could be enormously encouraged by the presence of savvy programming elements with self-sufficient handling abilities and decision facilities in an appropriated and progressive way. This paper presents a conceptual model for doctors and patients with an outline structure and describes them for research purposes for the improvement of the organization.<sup>[7]</sup>

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## **BUSINESS INTELLIGENCE (BI) TECHNOLOGY**

BI is progressively applicable for the healthcare system because we accept that a superior comprehension of the importance and point of view of BI could improve correspondence among the numerous people and organizations that utilize the term and conceivably upgrade its appropriateness.<sup>[1]</sup> The successful organization-wise decision-making could be extraordinarily encouraged by the presence of programming elements with self-ruling preparing capacities, which own a private data and information base, and which follow up on their condition based on data they get, see, measure, hold, and review.<sup>[7]</sup> BI technique and innovation can be viewed as empowering influence for putting away, breaking down, imagining, and offering admittance to a lot of information. For this reason, a wide scope of DSS, online analytical processing, and information mining apparatuses are utilized contemporarily in a BI framework.<sup>[1]</sup>

### **CBBI system**

There are so many computer-based tools or systems that have been created to provide support for information management and decision-making in the healthcare system.

Few of them are:<sup>[7]</sup>

- Management information system
- DSS
- Expert system
- Office automation systems
- Executive information systems.

Our comprehension of BI in medical care is that it should help hospital or clinical administration, the board in the comprehension of the abilities accessible in the organization and encourage managers in decision-making by incorporating all sorts of inner and outside entertainers coming about due to a wide range of cycles.<sup>[1]</sup>

## **HEALTHCARE ENVIRONMENT**

Healthcare is one of the most important elements to the development of a country and it is essential to the economic development of the inner security of the country.<sup>[2]</sup> Modern healthcare frameworks are demonstrated to shifting degrees on at least

one of a couple of essential plans that developed and have been refined since the late nineteenth century.<sup>[3]</sup> However, in current years, it was seen that medical services have gotten one of the amazingly intricate ventures on the planet, particularly in the Indian setting.

The explanations for it are a few.

1. The fast advancement of new technology
2. Enormous speed of socio-specialized technology
3. The different needs of patients
4. A growing number of clinics.

As of now, the health industry is one of India's major businesses, as far as income and employment.<sup>[2]</sup>

The impact of the health services workplace on the wellbeing and nature of care gave by health services workers. Intensifying our knowledge of how functioning conditions influence health service workers, the danger of mistakes and the nature of administrations for patients is vital to the health industry, especially the individuals who supervise or manager of healthcare organizations and set approaches that influence the physical or hierarchical working conditions, for health workers.<sup>[5]</sup>

Private clinics are the secret weapon in the health industry of the state and they devour a significant portion of assets for medical care. Effective local emergency clinics can contribute significantly toward accomplishing the decrease in infection, diseases, and other types of problems.<sup>[6]</sup> Specialists are concentrating in additional on restrictive consideration with an end goal to improve well-being and lessen the monetary weights related to constant sickness.<sup>[8]</sup>

Three distinct kinds of information sources have been found in a healthcare organization:<sup>[1]</sup>

- (a) Clinical information sources: Doctor's information, patient records, laboratory results, etc.
- (b) Administrative information sources: Clinical information, workforce information, money-related information, etc.
- (c) Outer information sources: Measurable information, clinical reports, pathology tests, insurance, etc.

### **Role of a doctor**

The doctor's role is very important in any hospital or clinic because he has dual responsibilities on his

shoulder for the hospital and patient. He leading the team in a hospital or clinic and giving the best healthcare service to the patient. The doctor has to understand some points to achieve the satisfaction level of a patient and achieving his goal.

Some points must be followed by doctors:<sup>[9]</sup>

1. Politeness
2. Gentleness
3. Good listener
4. Quick response
5. Pay full attention
6. Take responsibility
7. Give proper information
8. Respect patient's family
9. Take background history
10. Maintain privacy and confidentiality.

#### ***Conceptual model for doctor***

In this model, Figure 1 shows patients can book an appointment or register themselves for the scope of available services. The patients can book an appointment in three types; by walk-in, through call, and by e-mail. The patient enters into hospital as an outpatient department (OPD) patient, then the doctor examines the patient, and an investigation is done. If required, the doctor recommends some pathological and radiological tests by blood samples and X-rays, etc. After that, the doctor will diagnose the actual problem and prescribe medicine, and treatment is started. If the patient has recovered it is fine and if the patient has not recovered then he/she will visit the doctor and the doctor will change medicine. After changing medicines, the patient is continuously under the observation of the doctor, if the patient has not recovered then in this situation there are two conditional discussions, either refer the patient to some other hospital or admit the patient to the hospital. If the patient is admitted then treatment is started and the doctor checks the recovery of the patient in 2–3 days. Again, if the patient has not recovered then the doctor refers the patient to some other hospital and if the patient has recovered then the patient is discharged and leaves the hospital. The doctor prescribes some medicine before discharge and follow-up time is given to the patient.

#### **Model benefits**

1. Quickly determining the patient
2. Real-time monitoring of patients

3. Saves time for patients
4. Increased patient satisfaction level
5. Improved outcome for management.

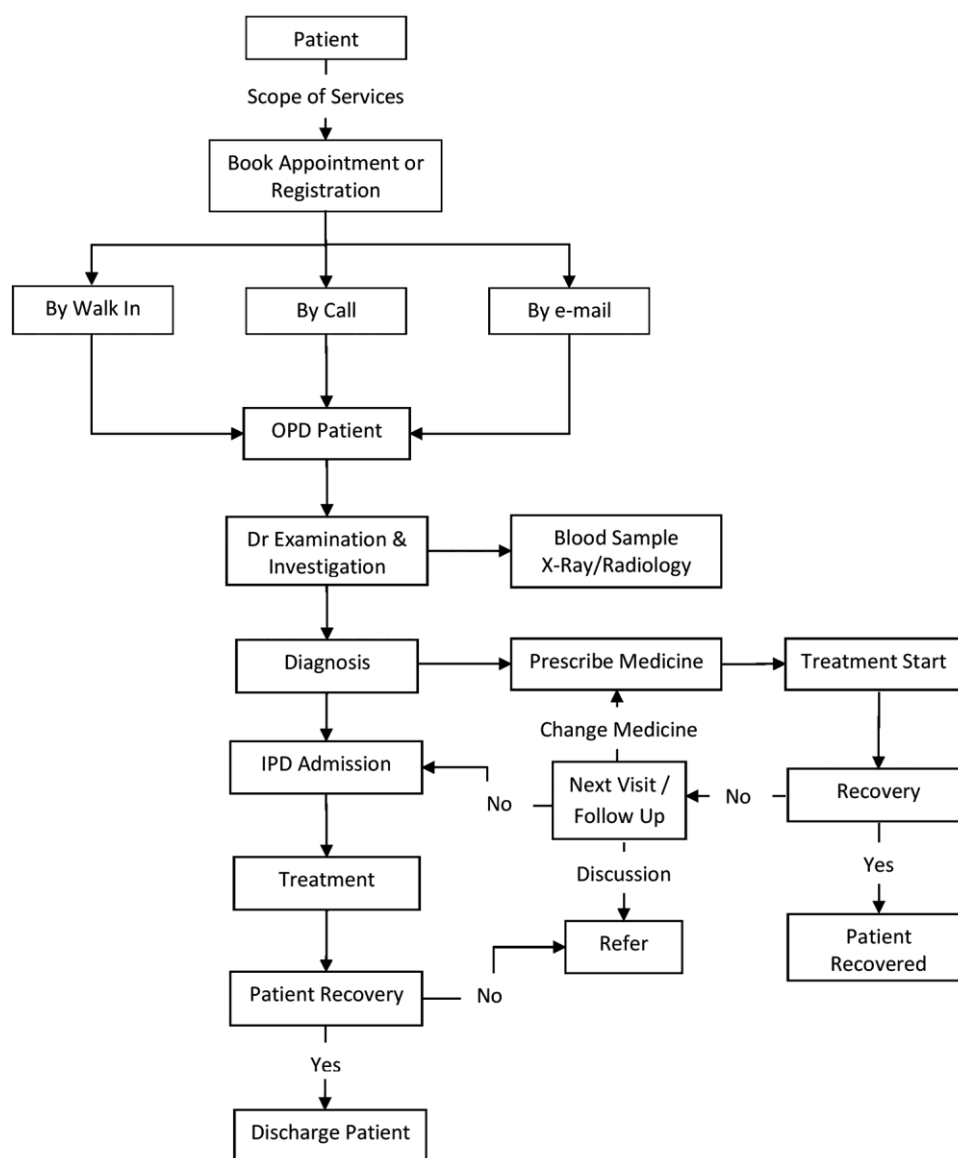
#### **Role of a patient**

In the present scenario, patients are putting at the center of the healthcare sector because there are numerous ins and outs behind patients. Patients invest more energy and time in the medical care system than the administrator or supervisor and he knows the actual problems or issues, that is, quality of service, proper hygiene, etc. Patients are also good at distinguishing delicate issues, for example, communication, behavior, caring neglect, etc., and are hard to catch with organizational monitoring. There are some points, which show that how can we understand a patient.<sup>[9]</sup>

1. Ask the right question
2. Make a good impression
3. Identify and understand the medical needs
4. Understand patient's actual problem
5. Proper communication
6. Patients skills
7. Patient satisfaction level
8. Remember patient
9. Try to connect emotionally
10. Try to collect feedback.

#### ***Conceptual model for patient***

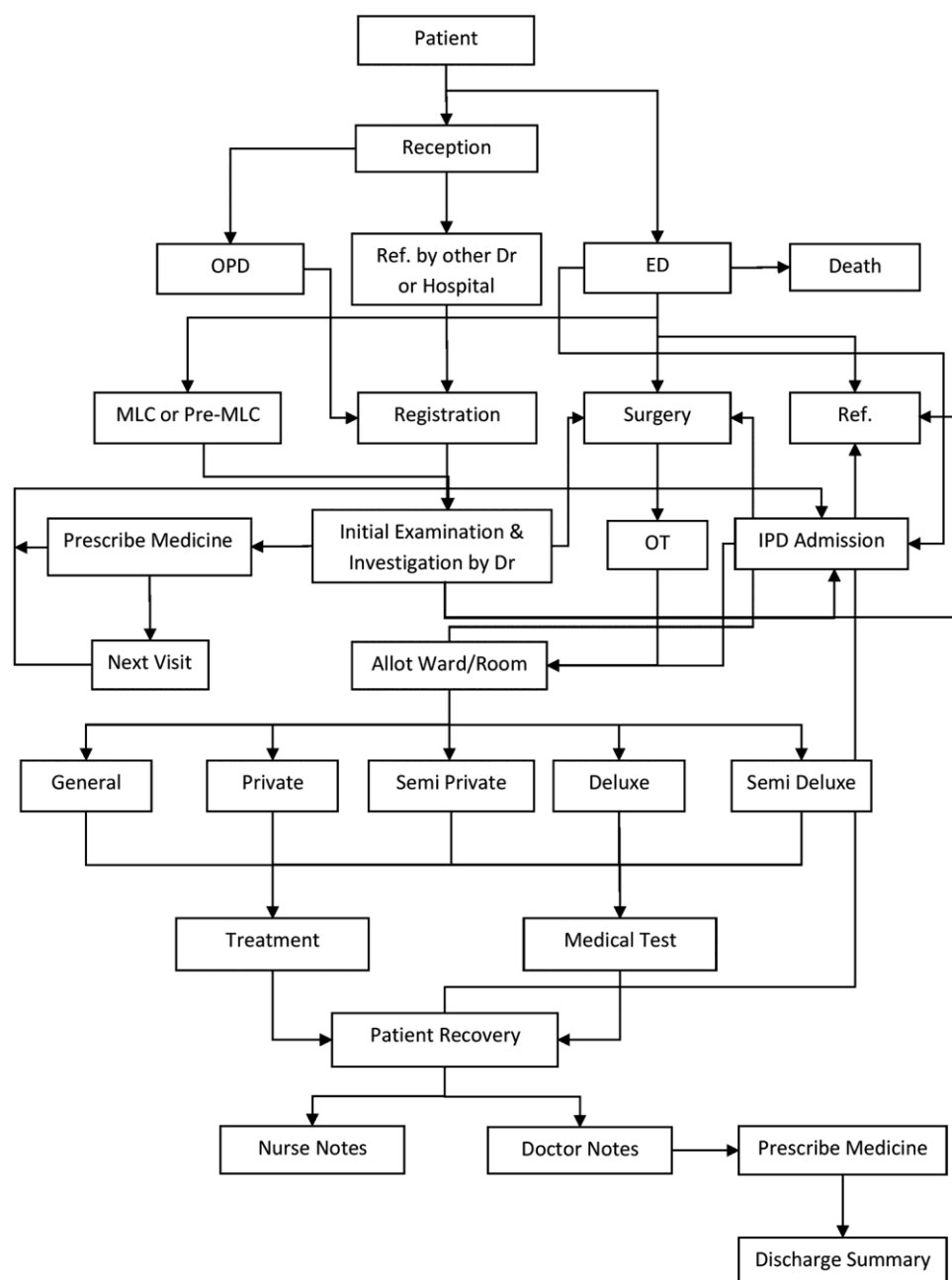
Each patient has an extraordinary visit and treatment program explicit to his/her condition. In any case, the same as you have a day-by-day schedule at home, hospital, and the healthcare organization also has such types of daily activities. In these organizations, the number of patients who visit every day, there are different types of patients like OPD patients, inpatient department (IPD) patients, emergency department (ED) patients, etc. They visit the hospital according to the hospital schedule or according to emergency. Figure 2 shows that, there are three types of conditions when a patient enters the hospital. First, in normal conditions, the registration is done at the reception, and the patient is treated as an OPD patient. In the second condition, the patient is referred by the doctor or by the hospital for treatment. Third, when an ED patient visits the hospital, the primary vital signs of a patient are checked in the ED department and if the patient's condition is not under control, then



**Figure 1:** Conceptual model for doctor

the patient is referred, if there are no vital signs available the patient is dead. There are two more conditions of a patient, that is, medico-legal case (MLC) or pre-MLC and surgery. If an MLC or pre-MLC condition is identified the initial examination and investigation are done by the doctor and decided for surgery and the patient is sent to the operation theater (OT). Sometimes surgery decision is taken in the ED department and the patient is sent to the OT directly and after surgery patient is shifted to the ward/room. For MLC or pre-MLC patients medicine is also prescribed and the patient is admitted to the ward/room. For a normal OPD patient, an initial examination and investigation are done by the doctor, and medicine is prescribed; then the patient may visit next time after 3–5 days. There is also a situation when a patient takes medicine for

2–3 days and there is no recovery then the patient comes to the hospital and is admitted as an IPD patient in a ward/room prescribed by the doctor. There are different types of ward/room facilities in the hospital like general ward/room, private ward/room, semi-private ward/room, deluxe ward/room, and semi-deluxe ward/room. The treatment plan is followed by the nursing staff and in some conditions, medical tests are also included in these ward/rooms. Nursing staff checks the patient from time to time, the doctor visits the patient from time to time and the patient's daily recovery information is recorded in nursing notes and doctor's notes. If a patient is not recovered then the patient is referred to some other hospital. If a patient is fully recovered then the doctor prescribes medicine and the patient is discharged.



**Figure 2:** Conceptual model for patient

### Model benefits

1. Complete patient information system
2. Improved daily activities and schedule
3. Better patient treatment and care
4. Quickly recalculating the OPD, ED visit, and IPD admissions and surgery.

### BI FUTURE SCOPE

In healthcare, presently appears to be somewhat ordinary to see BI as a significant driver, or if nothing else a trigger, for understanding authoritative profits and to gauge them progressively to make changes and enhancements.

To settle on dependable choices about the utilization of scant assets of medical services it is important to distinguish sources of proficiency or apparatuses that can add to improving results. In the healthcare system managers, supervisors and clients need ongoing data to better-overseeing information and to produce data and information expected to improve medical care administration quality and reduce hazards. Nonetheless, medical services explicit investigative abilities have been incorporated until today with other center operational applications just as implanted in clinical hardware and gadgets. Only here and there have they been effectively advanced as independent BI applications. Some examples,

noteworthy BI is incorporated with CBBI systems, clinical DSS, telemedicine system, and hand-held registering tablets seen wherever in emergency clinics, hospitals, multispecialty clinics, and healthcare centers. While the focal capacity of these advances is not examination, they all utilize investigation to make them more significant.

The future of BI in the healthcare system is at the convergence of issues in business and strategy, and the utilization of developing diagnostic capacities to make applications to address these difficulties. Giving ongoing data would appear to be essential for this. A common sense is that soon BI ought to be carried into nearer contact with the healthcare framework if managers and supervisors will adequately uphold proof-based practice, information management and to comprehend the connections among them. Quality and security must be estimated and improved when results are estimated, when variety in a neighborhood or provincial contrasts is disposed of, and when multidisciplinary groups sing from a similar tune sheet. BI esteem for medical services will along these lines not essentially be in improving correspondence and data arrangement. Or maybe, its commitment is in empowering better approaches for working, permitting to incorporate data, associations, and to quantify yields progressively.<sup>[1]</sup>

## CONCLUSION

In the recent few years, the exploration of administration quality in the healthcare industry has gotten a decent lot of consideration. Open clinics and hospitals offer a lot to learn about the working condition and internal activity of hospitals for improving administrative services and work culture. The open health care framework in the nation is a node that is little in the current framework. The paper has contended that CBBI

system is an amazing tool in specific decision-making and data-related problems in the current scenario. A predictable blend of research and flow of research in such a field as BI gives a likely solution for the fulfillment of these necessities in a uniform manner. BI must be carried out into nearer contact with the healthcare industry, if administrators or supervisors need help in proof-based practice, managing information, generating reports, and to comprehend the relationships among them. Furthermore, in this paper, two conceptual models are proposed which can give a down-to-earth approach for managers, administrators, and strategy makers to get individuals to draw in choices that impact their lives to build up.

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