

# Role of Hospital Information Systems in Improving Healthcare Quality in Hospitals

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## Abstract

**Background/Objective:** This paper represents the role of information systems in quality improvement in hospitals. Hospital Information Systems (HIS) have great potential in reducing healthcare cost and in improving health outcomes. The purpose of this study is to offer analytical research that explores the role of hospital information systems in delivery of healthcare in its diverse organizational and regulatory settings. This paper aims to examine the role of hospital information systems in improving health care quality in hospital. Primary data was collected through distributing questionnaire to patient. A total of 214 samples were collected from major corporate hospitals in the capital city of Tamil Nadu, i.e., Chennai and used for this research paper. **Methods and Analysis:** Friedman test was implied to find the effect of implementing hospital information systems in hospitals to improve healthcare quality. **Findings:** Implementing hospital information systems in hospitals has a greater effect on improving healthcare quality among hospitals and this increases patient satisfaction.

**Keywords:** Hospital Information Systems, HIS, Health Care Quality, HIS Implementation, Quality

## 1. Introduction

Hospitals are extremely complex institutions, with unique characteristics which include large departments and units, that coordinate care for patients. They rely hugely on Hospital Information Systems (HIS) to assist in the diagnosis, management and education for better and improved services and practices<sup>1</sup>. Quality of services can be improved through this. Information system quality is categorized into six major dimensions that include system quality, information quality, use, user satisfaction, individual impact and organizational impact<sup>2</sup>. Hospital information systems have great potential in reducing healthcare cost and in improving health outcomes. The rapid growth in the field of information technology has strongly influenced the businesses of many hospitals.

Hospital information system are in high demand to handle increased flow of patients and increasing populations and also aids the doctors and support staffs. Hospital information system streamlines operational activities and

enhances administration and control, patient care, cost control and increased revenue. In general one can define hospital information systems as comprehensive software for patient information integration, and to exchange comprehensive patient information between wards and other medical centers in order to expedite the process of patient care, improve quality, increase patient satisfaction and reduce cost<sup>3</sup>. A great goal of national healthcare system is not possible without using hospital information systems. Hospital information systems controls man functions in hospitals including admissions/discharge/transfers, pathology test result information, radiology test with appointment scheduling, special test information systems in medical research, inventory maintenance of medicines and other appliances, issues of medicines for patients, communications with external world and patient billing.

Hospital Information Systems can be defined as an integrated information system which improves patient care by increasing the user's knowledge and reducing

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uncertainty allowing rational decisions to be made from the information provided<sup>4</sup>.

Information Systems (IS) have much to offer in managing healthcare costs and in improving the quality of care<sup>5</sup>.

Some of the success factors of HIS deployment are discussed in further sections.

The success of the HIS deployment depends on a number of critical factors. First, the commitment of senior leadership to implement clear targets and expectations is crucial to the success of the business case. Changes to operational processes, job roles, and organizational culture will require resources and the strong and consistent support of leadership. All levels of management should be clearly informed and accountable for the key actions that need to be undertaken to maximize system benefits. Second, timely implementation of the inpatient information system is imperative because the consequent impact of delays on benefits realization is costly. Third, because the majority of annual expenses are from labor costs, senior management will need to partner with labor to take advantage of the efficiencies introduced to the workflow by the HIS. Fourth, internal policies must require physicians and frontline staff to comprehensively and accurately codify all hospital discharges and procedures. Finally, workflows must be redesigned to incorporate and exploit the system's functionality<sup>6</sup>.

Healthcare satisfaction has gained greater importance, especially in developing countries. It is both a service quality indicator and a quality component. Strong healthcare systems enable healthcare providers to deliver better quality and value to patients<sup>7</sup>. Previous research studies indicates that management factors related to HISs has been connection with successes and failures of these systems in recent years. Hence factors related to HIS quality should be considered in planning of such systems for implementation and the managers should also receive the required trainings<sup>8</sup>.

Hospitals are information-intensive organizations and spend substantial sums on information management and processing, which has to be carried out using appropriate information systems. A Hospital Information System (HIS) is a computer-based system designed to facilitate the management of the administrative and medical information within a hospital. The main aim of the system is improvement in the quality of the care provided<sup>9</sup>.

The HIS is mainly for patient registration, fulfillment of diagnosis/treatment, and billing processes (see Table

1). Furthermore, it is mentioned that hospitals with more competent staff are proved to be much more efficient as far as information system usage is concerned than others with less competent staff.

**Table 1.** HIS benefits for patients

| Information system      | Number of Hospitals (n = 112) | Percentage |
|-------------------------|-------------------------------|------------|
| Administrative/Economic | 92                            | 82         |
| Medical/Nursing         | 49                            | 44         |
| Laboratory              | 34                            | 31         |

Source<sup>10</sup>

Economic evaluation studies have been more frequent in the evaluation of IS in healthcare than in IS evaluation in general. In the healthcare context, 13 percent of evaluative studies used the economic evaluation method. This is still considerably more than in IS research in other sectors, where the proportion is only 4 percent<sup>11</sup>. However, these studies have been criticized because in many cases it is difficult to prove that a particular benefit or cost can be attributed solely to a new information system<sup>12</sup>.

- Effects like decreased costs, improved processing times, etc., are often difficult to measure, as there can be many factors that influence them<sup>13</sup>.
- Since information systems may have organization-wide, intangible and long-lasting effects and costs, economic evaluation of information systems is considered difficult<sup>14,15</sup>.
- The costs and benefits of IS are largely qualitative or intangible from nature, and thus are difficult to measure in terms of monetary value or time<sup>16,15</sup>.
- The objectivity of these measures has also been questioned, as the underlying estimates are themselves based on experts' subjective predictions<sup>14</sup>.
- Even if objective data relevant to the success of an information system can be identified, they are generally not recorded and thus not available<sup>15</sup>.
- Performance and financial factors tend to supersede organizational or psychological factors when computer-based technology is considered<sup>17</sup>.
- These methods of evaluation are costly and prevent comparisons between different studies<sup>15,14</sup>.

- Traditional accounting systems rarely provide the information needed to evaluate the costs and benefits associated with a particular IS<sup>18</sup>, so in many cases these measures are therefore simply not feasible.

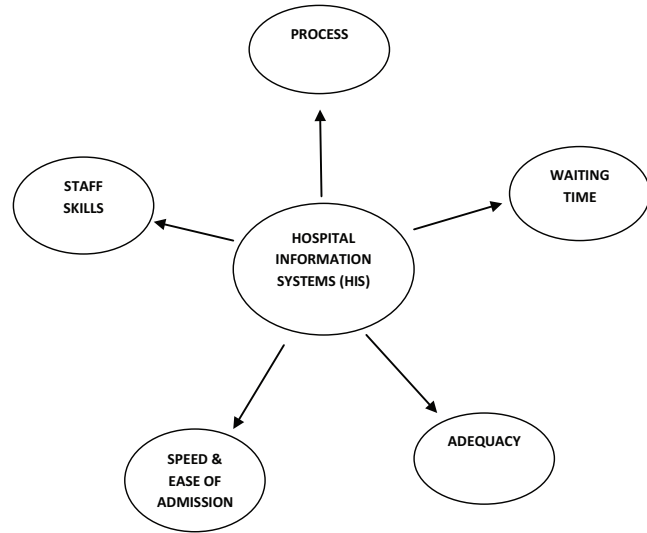
Numerous researchers have suggested methods for calculating the real contribution of an information system to the performance of organizations or companies. However, all of them underline the fact that a lot of effort is needed in order to eliminate the restrictions mentioned above.

### 1.1 System Usage

Another way of measuring the success of an information system is system usage, which reflects the degree to which users are confident about the effectiveness of the information systems they use<sup>19</sup>. In IS research, system usage may be defined as: Either the amount of effort expended interacting with an information system or, less frequently, as the number of reports or other information products generated by the information system per unit time<sup>20</sup>.

## 2. Methods and Materials

Questionnaire was adapted from previous research and was used in this. The questions recorded the attitude of the various respondents present, towards the role of hospital information systems in improving quality in hospitals. The respondents of this research comprises of patients and hospital administrators who provided the complete impression of hospital information systems and its effects of improving healthcare quality.



Source: Author

### 2.1 Research Design

The research design used in this study is descriptive in nature.

### 2.2 Sampling Frame

The sampling technique followed to collect the data is Purposive Simple Random Sampling technique.

### 2.3 Statistical Tools Used

Friedman test, percentage analysis.

## 3. Results and Discussion

Inference: The Table 2 shows the difference in health-care quality dimensions in hospital, between before and

**Table 2.** Table showing before and after implementation of Hospital Information Systems (HIS)

| Sl. No. | Dimensions                  | Critical percentage (%) before and after implementing hospital information system |   |
|---------|-----------------------------|---|---|
|         |                             | Before  | After                                   |
| 1       | Process                     | 68 % very bad, 14 % bad, 16 % average   | 18 % very bad, 6 % bad, 10% 76 %average |
| 2       | Waiting time                | 82% very bad, 8% bad, 10% average   | 20% very bad, 11% bad, 69% average      |
| 3       | Adequacy                    | 73% very bad, 17% bad, 10% average  | 16% very bad, 2% bad, 82% average       |
| 4       | Speed and ease of admission | 69% very bad, 15% bad, 16% average  | 2% very bad, 5% bad, 93% average        |
| 5       | Staff skills                | 82% very bad, 13% bad, 5% average   | 10% very bad, 13% bad, 77% average      |

Source: Secondary data from hospital records.

after implementation of hospital information systems. Implementation of hospital information systems has created a huge difference in reducing waiting time of patients and speed of admission.

**Table 3.** Effects of Hospital Information Systems on dimensions influencing healthcare quality in hospitals (Friedman Test)

**Null hypotheses:** There is no effect on implementing hospital information systems in hospitals to improve dimensions of healthcare quality.

**Alternate hypotheses:** There is an effect on implementing hospital information systems in hospitals to improve dimensions of healthcare quality.

| Sl. No. | Dimensions                  | Chi-square value | P value | Mean rank |
|---------|-----------------------------|------------------|---------|-----------|
| 1       | Process                     | 734.42           | <.001   | 11.24     |
| 2       | Waiting time                |                  |         | 12.79     |
| 3       | Adequacy                    |                  |         | 10.72     |
| 4       | Speed and ease of admission |                  |         | 10.98     |
| 5       | Staff skills                |                  |         | 10.02     |

Source: Primary data.

**Inference:** Since 'P' value is less than 0.001,  $H_0$  is rejected at 1% level of significance which states that there is no effect on implementing hospital information systems in hospitals to improve dimensions of healthcare quality. There is significance difference between mean ranks on the dimensions of health care quality effect for implementation of hospital information systems. Based on mean rank waiting time (12.79) is most important dimension that has been more influenced by the implementation of hospital information systems, followed by process (11.24), speed and ease of admission (10.98), adequacy (10.72) and staff skills (10.02). Thus it is observed that implementing hospital information systems has positive effects on the dimensions of healthcare quality and so it improves healthcare quality in hospitals.

## 4. Conclusion

The first and most important dimension that has a positive effect through implementing hospital information system is patient (customer) delight when waiting time is reduced. This helps them to attain a level of satisfaction,

from which patients look forward happily in continuing the treatment. When waiting time is reduced, it automatically takes the patient to the next level viz., admission procedure. In future, improvements in technology will bring tremendous growth in healthcare sector which will reduce the burden on administrators and increase the level of quality and satisfaction for patients.

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