# The acceptance level of Hospital Information Management System (HIMS) among the nursing officials working in a teaching hospital

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**Abstract:**

**BACKGROUND:** The acceptability of hospital staff in the use of hospital information management system (HIMS) is an emerging research area it can explain the fate of any HIMS development and implementation project in hospitals. The aim of this study was to observe the level of acceptance of HMIS among nursing officials working at a teaching hospital.

**MATERIALS AND METHODS:** This cross-sectional study was conducted for 1 year in a teaching hospital of northern India by using a pretested questionnaire. Our study participants were nursing officers who were not under the probation period and we used a purposive sampling (10% nurses from each ward). Our sample size was 256.

**RESULTS:** We have observed that majority of 174 (67.96%) participants had good acceptability to the HIMS system. Our study revealed that most of the participants were aware of HIMS. Among all participants, nearly half of them had good acceptability to the HIMS system. This is may be due to their job profiles, distribution of their working places, and their past experiences with HMIS. The bottlenecks such as connectivity problem, error prevention, and lack of training can be addressed by the hospital management by proper measures.

**CONCLUSION:** The acceptance level of HIMS among the nursing officials working in a teaching hospital was good.

**Keywords:**

Administrator, hospital administration, hospital information system, nurse

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## Introduction

Health information technology (HIT) is considered as the most assuring device for advancing the overall condition, efficiency, and safety of delivery system of health services. Broad cycle and regular use of HIT will improve health-care quality; reduce medical flaws; decrease the cost of health care; decline paperwork; improve administrative efficiencies; and broaden access to economical care.[1-9]

In modern health-care facilities, hospital information systems (HISs) and hospital information management systems (HIMSs) are completely cohesive. In addition, it is specifically designed to manage the routine activity of hospitals, like administration, finance, and treatment aspects. They are now indispensable for running a modern hospital. HIMS can store patient data as well as other medical data such as laboratory reports, diagnostic, treatment; follow-up

reports as well as crucial clinical decisions.[10] The HIMS can improve the performance of the hospital in monetary terms as well as in patient satisfaction. However, despite evidence of these benefits, utilization of HIMS is still low in hospitals[11] The acceptability of hospital staff in the use of HIMS is an emerging research area it can explain the fate of any HIMS development and implementation project in hospitals.[12]

Multiple operational research is going on so that failure of implementation of HIMS is better explained which is directly linked to the acceptance or rejection of hospital staff toward these HIS.[13] The knowledge and attitude about using the HIMS in hospitals, skills of the hospital staff, and the present scenario of computerization in health facilities and their positive or negative attitude toward HIMS are considered among major hurdle for fruitful implementation and adoption of HIS in hospitals. For this reason, on-the-job training of hospital staff is essential to developing favorable attitudes toward HIMS, and thus self-confidence can be built about HIMS among the staff members.[14]

Engaging clinicians and other hospital staff including nurses along with providing strong institutional support is the key to successful implementation and operating a HIMS in the hospitals. These strategies could remove significant resistance and lessen negative attitudes and increase the acceptance level of HIMS by hospital staff. Due to this, it is essential to gauge the level of HIMS acceptance among health-care workers and explore the determinants of HIMS hindering the acceptance among all users.[15]

Multiple studies have documented that the use of HIMS is challenging. This is due to the diversity of computer interfaces, multiple navigational options. Sometimes, it is observed that few HIMS are not user-friendly at all. This overburdens hospital staff to learn the various operations of HIMS. It is considered barrier to acceptance of HIMS. Initially, it is resource consuming also. This extra load on hospital staff fosters a negative attitude toward technology adoption.[16] Although software giants such as ORACLE, JAVA, and INFOSYS are slowly improving HIMS usability. Use of new technology such as voice recognition and voice assistants such as Google assistant will radically simplify HIS operations in future. Till now, designing user-friendly software for HIMS poses a significant challenge to IT professionals.[17]

Every medical institution has a vital role to play in the overall improvement of skills attitude and knowledge of the nursing officials working in hospital regarding HIMS. Overall, a little focus has been given on the research and development on this topic. Still, scarcer is the administrative research studies on this subject.

To our knowledge, the nursing officials have been the focus of research in assessment of their job satisfaction, stress level measurement, etc., Although nursing officials are vital for using HIMS, they are the managers of the ward. To our knowledge, very few observational (in technological domain) studies have been conducted with them, globally. With this background, we intended to do this is it observational for baseline assessment and further overall improvement in the acceptance of HIMS among the nursing officials working in a tertiary care hospital.[18] Hence, our study is quite pertinent to assess the acceptability level of HIMS system among nurses working in a teaching hospital; it will help us to know not only to know their acceptance levels of HIMS but also their needs/barriers so that as a health-care administrator we can further improve our HIMS in our hospital for a better outcome. The aim of our study was to study the level of acceptance of HIMS among nursing officials working in a teaching hospital.

## Materials and Methods

### Study design and setting
The cross-sectional study was conducted during January–December 2019 to assess the level of acceptance of HIMS among nursing officials who were using HIMS at eight different areas of a teaching hospital.

### Study participants and sampling
A total number of nurses using HIMS was 2402. The sample size was calculated by keeping confidence interval as 95% and the margin of error at 5%. Based on the calculations, the sample size came 248. However, we took 256 nursing staff as sample proportionally from 8 areas. A random sampling method was used.

### Data collection tool and technique
A validated questionnaire on HIMS acceptance was prepared by the investigator in determining the reliability of the survey, a pilot study was conducted on 30 nurses and the overall results of Cronbach's α =0.781 indicate that the questionnaire was reliable for the study. The questionnaire contained two sections: in the first section, the demographics have been described and in the second part, it consists of questions about the acceptance level of HMIS among the nurses. Every question was measured on a Likert scale with a range of 1–5. Further, the scale is divided into two groups: acceptable and nonacceptable – <3 is acceptable and >3 is not acceptable.

Questionnaires were distributed by the investigator in each area of the hospital on a random basis by the "lottery method." Data were collected by the investigator by distribution and collection of the questionnaire [Figure 1]. For the study purpose, we
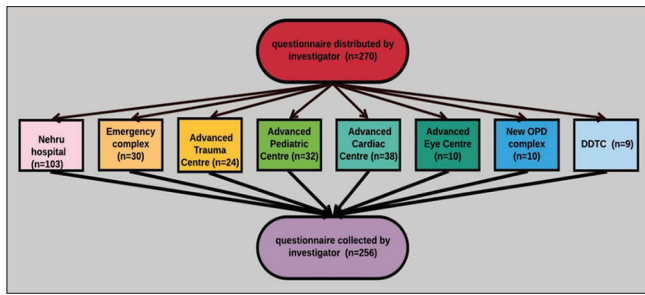
**Figure 1:** Data collection method

included all nurses who had completed their probation period and who had at least 1 month of experience of handling HIMS. All participants were volunteers, who received assurances of confidentiality.

### Ethical considerations

We also received informed consent from all participants. The ethical approval was obtained from the Institutional Ethics Committee. Data were accordingly analyzed using SPSS version 21 (IBM Chicago, USA). Descriptive statistics, correlation, group comparison, Chi-square, and regression analyses were utilized.

## Results

We found that most (99, 38.7%) of our participants belonged to the age group of 31–40 years. Most (215, 84%) of them were female. Majority (149, 58%) of them had bachelor's degree in nursing. Most (217, 84%) of them were from urban areas. Most of them (110, 43%) belonged to Punjab.

Regarding the full name of HIMS, it was found that 88.7% of the participants knew the full name correctly [Table 1].

Regarding accessibility, a total of 58.2% of participants responded that the HIMS system of thehospital was easily accessible, while 22.7% responded that the system accessibility was average. However, 17.2% of participants responded that the system was very easy. Only 0.8% and 1.2% had mentioned it difficult and very difficult, respectively.

Majority (67.5%) of the participants agreed that the HIMS system was compatible with their capability and 32.4% found it was not compatible.

Majority of the participants (71.8%) found HIMS system easy to use for everyone and 27.8% found it not easy to use. A total of 41.8% of the participants found that the HIMS is average to work with. However, 37.9% and 7% of participants found it enjoyable and very enjoyable, respectively. Only 9.4% responded that the system was not enjoyable at all. Most of our participants (41%) replied that they do not know about the error prevention

mechanism. About 27% of participants responded that there is an error prevention mechanism and 31.6% replied that there is no error prevention mechanism.

Most 66.8% of our respondents answered that they were familiar with the HIMS. Nearly 26.6% answered as average, 11.7% answered as very familiar, and only 5.5% of participants responded that they were not familiar with the system. A total of 33.2% and 5.9% of participants responded that the system was flexible and very flexible, respectively. Most (67.2%) of the participants responded that sometimes they get annoyed while using this system, while 18.8% responded that they frequently get annoyed by this system and 5.9% told that they always get annoyed while using this system.

Total 57.4% of the participants responded that the robustness of system was average, 22.3% considered it to be just robust, while 5.9% believed the system was not very robust. Majority (44.1%) of the participants responded that HIMS sometimes provide online or offline help, while 25.4% responded that this system never provides offline or online help. Among all participants, only 18% responded that HIMS always provide offline or online help/guidance. Majority (59.8%) of the participants agreed that sometimes this HIMS induces stress, while 25% agreed that this HIMS never induces stress while working. Regarding error prevention, 47.3% of the participants ranked this system average, 33.2% responded that it was trustful, 5.9% said that it was very trustful, and 5.1% responded that it was not trustful in respect to error prevention. Majority (40.2%) of the participants encountered system failure once a week, 34.4% encountered system failure once a month, and 16% replied that they encountered system failure once every day. Majority (39.5%) of the participants did not know whether their system has a mechanism to detect user responsibility, 34.4% responded that their system does not have a mechanism to detect user responsibility, and 26.2% responded that there is a mechanism to detect user responsibility.

The connectivity (interlinking/hyper linking facility) was not statistically significant associated with age (*P* value 0.682), education (*P* value 0.37), experience in computers (*P* value 0.487), HIMS experience (*P* value 0.229), PGI experience (*P* value 0.272), gender distribution (*P* value 0.254), state distribution (*P* value 0.423) or training taken (*P* value 0.192). Regarding acceptability, 42.2% participant scored this system as 3 (>3 acceptable), 39.5% scored it 4, and 7.4% ranked it 5.

## Discussion

This study was conducted to assess the level of

**Table 1: The responses regarding the acceptability questionnaire**

| Questions | Responses | *n*=256, *n* (%) |
|---|---|---|
| 1. What is the full form of HIMS? | Reply | |
| | True | 227 (88.7) |
| | False | 29 (11.3) |
| | Total | 256 (100.0) |
| 2. Your HIMS system is easily accessible? | Very easy | 44 (17.2) |
| | Easy | 149 (58.2) |
| | Average | 58 (22.7) |
| | Difficult | 3 (1.2) |
| | Very difficult | 2 (0.8) |
| | Total | 256 (100.0) |
| 3. How much compatible is your HIMS system with the user's capability? | Very compatible | 27 (10.5) |
| | Compatible | 146 (57.0) |
| | Average | 81 (31.6) |
| | Least compatible | 1 (0.4) |
| | Don't know/not compatible | 1 (0.4) |
| | Total | 256 (100.0) |
| 4. Your system is easy to use for everyone? | Very easy | 39 (15.2) |
| | Easy | 145 (56.6) |
| | Average | 58 (22.7) |
| | Not easy | 13 (5.1) |
| | Don't know/worst | 1 (0.4) |
| | Total | 256 (100.0) |
| 5. Does your system being efficient? (Quick and economical) | Very efficient | 19 (7.4) |
| | Efficient | 105 (41.0) |
| | Average | 108 (42.2) |
| | Not efficient | 22 (8.6) |
| | Can't say/worst | 2 (0.8) |
| | Total | 256 (100.0) |
| 6. Do you enjoy your HIMS system while working? | Very enjoyable | 18 (7.0) |
| | Enjoyable | 97 (37.9) |
| | Average | 107 (41.8) |
| | Not enjoyable | 24 (9.4) |
| | Can't say/worst | 10 (3.9) |
| | Total | 256 (100.0) |
| 7. In your system has any error prevention mechanism? | Yes | 70 (27.3) |
| | No | 81 (31.6) |
| | Don't know | 105 (41.0) |
| | Total | 256 (100.0) |
| 8. How easy is error prevention in your system? | Very easy | 37 (14.28) |
| | Easy | 112 (42.85) |
| | Average | 37 (14.28) |
| | Not easy | 70 (27.55) |
| | Can't say/worst | 00 (00) |
| | Total | 256 (100.0) |
| 9. Did your system fulfil your expectations? | Very much fulfilled | 8 (3.1) |
| | Fulfilled | 103 (40.2) |
| | Average | 118 (46.1) |
| | Not fulfilled | 16 (6.3) |
| | Can't say/worst | 11 (4.3) |
| | Total | 256 (100.0) |

*Contd...*

**Table 1: Contd...**

| Questions | Responses | *n*=256, *n* (%) |
|---|---|---|
| 10. Does your system is familiar with your knowledge? | Very familiar | 30 (11.7) |
| | Familiar | 141 (55.1) |
| | Average | 68 (26.6) |
| | Not familiar | 14 (5.5) |
| | Can't say/worst | 3 (1.2) |
| | Total | 256 (100.0) |
| 11. Does your system is flexible, i.e., you can adjust your system according to your needs? | Very flexible | 15 (5.9) |
| | Flexible | 85 (33.2) |
| | Average | 70 (27.3) |
| | Not flexible | 70 (27.3) |
| | Can't say/worst | 16 (6.3) |
| | Total | 256 (100.0) |
| 12. Do you ever get annoyed while using your system? | Never | 19 (7.4) |
| | Sometimes | 172 (67.2) |
| | Very frequently | 48 (18.8) |
| | Always | 15 (5.9) |
| | Can't say/worst | 2 (0.8) |
| | Total | 256 (100.0) |
| 13. Is your system robust? | Very robust | 4 (1.6) |
| | Robust | 57 (22.3) |
| | Average | 147 (57.4) |
| | Not very robust | 15 (5.9) |
| | Can't say/worst | 33 (12.9) |
| | Total | 256 (100.0) |
| 14. Does your system provide online or offline help/guidance? | Always | 46 (18.0) |
| | Sometimes | 113 (44.1) |
| | Very frequently | 20 (7.8) |
| | Not at all | 65 (25.4) |
| | Can't say/worst | 12 (4.7) |
| | Total | 256 (100.0) |
| 15. Reply of participants in regard to feeling stressed while working on HIMS system: | Can't say | 5 (2.0) |
| | Not at all | 64 (25.0) |
| | Very frequently | 25 (9.8) |
| | Sometimes | 153 (59.8) |
| | Always | 9 (3.5) |
| | Total | 256 (100.0) |
| 16. How much you trust your system for preventing any error? | Very trustful | 15 (5.9) |
| | Trustful | 85 (33.2) |
| | Average | 121 (47.3) |
| | Not at all | 13 (5.1) |
| | Can't say/worst | 22 (8.6) |
| | Total | 256 (100.0) |
| 17. How frequently you encounter system failure? | Never | 13 (5.1) |
| | Once in a year | 11 (4.3) |
| | Once in a month | 88 (34.4) |
| | Once in a week | 103 (40.2) |
| | Once in a day | 41 (16.0) |
| | Total | 256 (100.0) |
| 18. Is your system having a mechanism to detect user responsibility/mistake? | Yes | 67 (26.2) |
| | No | 88 (34.4) |
| | Don't know | 101 (39.5) |
| | Total | 256 (100.0) |

*Contd...*

**Table 1: Contd...**

| Questions | Responses | *n*=256, *n* (%) |
| --- | --- | --- |
| 19. Does your system have interlinking/hyper linking facilities? | Yes | 54 (21.1) |
| | No | 76 (29.7) |
| | Don't know | 126 (49.2) |
| | Total | 256 (100.0) |
| 20. According to you how much score will you give to this system regarding acceptability? | 5 | 19 (7.4) |
| | 4 | 101 (39.5) |
| | 3 | 108 (42.2) |
| | 2 | 27 (10.5) |
| | 1 | 1 (0.4) |
| | Total | 256 (100.0) |
| 21. Do you want to add any new features to this existing HIMS? | Yes | 87 (34.0) |
| | No | 169 (66.0) |
| | Total | 256 (100.0) |

HIMS=Hospital Management Information System

acceptance of HIMS among nursing officials related to admission discharge transfer module at a teaching hospital by using a questionnaire.

Our study revealed that most of the participants were aware of the full form of HIMS. Among all participants, nearly half of them had access to the HIMS system. This may be due to multiple reasons such as the difference in their job profiles, distribution of their working places, differences in their experiences, or limited availability of computers in the hospitals as this hospital is not fully computerized. However, we must identify the root causes of average accessibility or difficult accessibility to HIMS with further qualitative studies as we had limited scope in our present study. Similar findings (i.e. lack of computer availability was the main reason for suboptimal utilization of HIMS) were observed in a study conducted by Khalifa *et al*.(2015).[19]

Regarding human capability (knowledge and skills) and system compatibility, it was observed that nearly half of the participants agreed that their system is compatible with their capability (knowledge and skills). It reflects that half of the participants were still not capable (knowledge and skills) to handle the system. Hence, this is a big concern as an administrator, and it will affect the acceptance level among the nurses, so we have to find out the causes and we need to rectify this problem. A similar finding was observed in a study conducted by Alipour and Zarei (2017) in Iran.[20] That study revealed that the level of computer knowledge and skills had more dominant role in the acceptance of HIS among the nurses.

Our study revealed that approximately one-third of the participants responded that the HIMS system is average difficult in use. It is also a concern to us, this is because the nursing officials are the backbone of any hospitals and they play an important role in HIMS. Accurate data entry is important not only for the patients but also for the

hospitals to avoid any kind of future litigation. It is most important that the HIMS system should be easy to use, as a complicated HIMS system can adversely affect nursing acceptance toward HIMS system usage. A similar finding was observed in a study conducted in Iran, it was observed that image in using HIS and perceived ease of use of HIS had a more dominant role in the acceptance of HIS.

Regarding system efficiency, most of the participants ranked the existing HIMS system average to an efficient category. In contrary to our findings, a systematic review conducted by Huryk (2010) found that overall HIMS system was not efficient at all and it led to user dissatisfaction.[21]

Most of the participants responded that they enjoy this HIMS system while working. It is a good sign for any organization because if a worker enjoys his/her work, it will increase productivity and acceptance.

Less than half of the participants responded that they know about the error prevention mechanism in the HIMS. Among them, nearly one-third of the participants found it easy to correct the error. Less than half of the participants responded that the software had fulfilled their expectations (user-friendly experience).

A similar finding was observed in a study (systematic review) conducted by Huryk (2010) where it is reflected that system slowdown and system downtime has a significant role in user dissatisfaction.[21] As per their overall experience, most of the participants graded the HIMS average on 5-point Likert scale. Many of them responded that they want additional features in the existing HIMS. Among all age groups, it was found that the middle age (30–40) group participants responded that they were satisfied with the HIMS.

Among all participants, only one-third of them responded that the system is flexible to use. This may

be the main reason that our majority of the participant responded that they often get annoyed with the system and they become stressed. System flexibility is one of the important determinants for user acceptance. A study conducted by Chow *et al*.(2012) in Hong Kong revealed that a user-friendly and flexible HIMS system had a positive correlation with nursing acceptance.[22]

Many of the participants perceived that the system is not robust enough and not very trustful and they do not get any online or offline help, even hyperlinking facility is also not available on this HIMS.

Most of the participants complained that every week they encountered system failure which is very distressing to them. In other studies, it was found that variables such as age, working experience with computers, knowledge, and knowledge about computers are significantly associated with user acceptance level.[23-30] However, in our study, it was found that only the age factor is associated with user acceptance level. [Table 2] This may be due to this is an apex medical institute in India and it attracts good quality nurses who are highly educated with a good attitude who can handle efficiently HIMS system.

### Limitation and recommendation
Small sample size is the limitation of our study, so if we have to generalize the findings, we have to conduct a similar study with a larger sample size in the future. We recommend that based on our study findings, (1) training of the nursing officials for HIMS may be conducted with the help of the IT department so that in future, the user acceptance increases; (2) HIMS system may be upgraded with modern facilities (like hyperlinking, offline help like windows, software, hardware, etc.; (3) equal opportunity for HIMS handling should be given to all nurses on a rotation basis so that they become digitally empowered; and (4) a 24 × 7 call center can be incorporated in the IT department to fix any shutdown problem.

## Conclusion

Our study concluded that the overall user acceptance for HIMS is good although there is a lot of scope for improvement.

### Acknowledgment and ethical–moral code
The authors would like to thank all the authors of those books, articles, and journals that were referred in preparing this manuscript. Ethical approval was taken from the Institute Ethical Committee and informed consent was obtained from the participants.

### Financial support and sponsorship
Nil.

**Table 2: Association between hospital management information system acceptance level with the other variables**

| Variables | Frequency (%) | P |
|---|---|---|
| Age* (years) | | |
| 20-30 | 72 (28.1) | 0.041* |
| 31-40 | 99 (38.7) | |
| 41-50 | 58 (22.7) | |
| 51-60 | 27 (10.5) | |
| Gender distribution | | |
| Male | 41 (16.0) | 0.430 |
| Female | 215 (84.05) | |
| Education status | | |
| DIP | 93 (36.35) | 0.085 |
| BSC | 149 (58.2) | |
| MSC | 12 (4.7) | |
| PHD | 1 (0.4) | |
| Others | 1 (0.4) | |
| Residence | | |
| Urban | 217 (84.8) | 0.599 |
| Rural | 39 (15.2) | |
| State | | |
| Chandigarh | 102 (39.8) | 0.094 |
| Haryana | 8 (3.1) | |
| Himachal Pradesh | 8 (3.1) | |
| Kerala | 8 (3.1) | |
| Pondicherry | 1 (0.4) | |
| Punjab | 110 (43.0) | |
| Pondicherry | 19 (7.4) | |
| Working experience** (years) | | |
| 1-10 | 124 (48.4) | 0.040** |
| 11-20 | 78 (30.5) | |
| >20 | 54 (21.1) | |
| Designation | | |
| DNS | 7 (2.7) | 0.259 |
| ANS | 2 (0.8) | |
| SNO | 167 (65.2) | |
| NO | 80 (31.3) | |
| HIMS experience*** (years) | | |
| 2-5 | 130 (50.8) | 0.043*** |
| 6-10 | 117 (45.7) | |
| >10 | 9 (3.5) | |

*Significant at< 0.05, **Significant at< 0.05, ***Significant at< 0.05, HIMS=Hospital Information Management System, DNS=Deputy Nursing Superintendent, SNO=Senior Nursing Officer, ANS=Assistant Nursing Superintendent, NO=Nursing Officers

### Conflicts of interest
There are no conflicts of interest.

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