

ASSESSMENT OF WAYFINDING SIGNAGE IN A TERTIARY CARE HOSPITAL AND ITS EVALUATION TOWARDS QUALITY IMPROVEMENT

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ABSTRACT:

Background: Hospital environments are complex, with many departments and service areas that can be confusing for patients and visitors. The wayfinding signage is an important part of the hospital environment that can help individuals find healthcare services and navigate the hospital independently. The quality of the signage may affect patients experiences and satisfaction with hospital wayfinding.

Objective: To assess the quality of the existing hospital wayfinding signage and its association with patient satisfaction and identify signage attributes associated with overall satisfaction.

Method: A hospital based, cross-sectional study was carried out at Rajendra Institute of Medical Sciences (RIMS), Ranchi between July 2025 and July 2026. The study included 400 adult patients; attendants and visitors were selected by using a non-probability convenience sampling technique. Data were obtained from the study participants through a pre-designed, pre-tested, structured questionnaire administered by an interviewer. The questionnaire covered socio-demographic characteristics, details related to the hospital visit, navigation experience, evaluation of existing wayfinding signage, and participants' suggestion. The instrument demonstrated good internal consistency, with a Cronbach's alpha coefficient of 0.869. Data were entered and analysed using Microsoft Excel and Jamovi Statistical Software (version 2.7.37). Appropriate statistical methods were applied, including descriptive statistics, independent-samples t-test, one-way ANOVA or Welch's ANOVA, Pearson's correlation, multiple linear regression, and Pearson's chi-square test.

Results: The overall mean patient satisfaction score was 23.15 ± 3.71 , with an overall mean satisfaction of 3.86 ± 0.62 . Among the assessed signage attributes, the language had the highest mean score (4.28 ± 0.59), followed by visibility (4.25 ± 0.61) and readability (4.24 ± 0.66). A significant relationship was found between overall patient satisfaction and the visibility, readability and language of signage ($p < 0.001$). Analysis using multiple linear regression also showed that the three attributes significantly predicted overall patient satisfaction and explained 73.0% of its variance ($R = 0.854$; $R^2 = 0.730$; adjusted $R^2 = 0.728$), with the language showing the strongest standardized effect ($\beta = 0.376$), followed by readability ($\beta = 0.274$) and visibility ($\beta = 0.265$). A strong positive correlation was found between overall patient satisfaction and the signage audit score ($r = 0.727$, $p < 0.001$). The patient satisfaction also differed significantly across the poor-, average-, and good-quality signage classifications, with the mean satisfaction scores of 16.6 ± 4.15 , 21.4 ± 2.72 and 25.6 ± 2.52 , respectively (Welch ANOVA, $p < 0.0010$). The association between signage quality classification and satisfaction level was also significant ($\chi^2 = 216.059$, $df = 2$, $p < 0.001$).

Conclusion: The study established a strong positive correlation between the quality of hospital wayfinding signage and the satisfaction of the patient. The language, readability and visibility were important predictors of satisfaction and the participants in areas classified as having good-quality signage reported substantially higher satisfaction than those exposed to average- or poor-quality signage. The regular assessment, maintenance and improvement of hospital wayfinding signage, especially its language, readability and visibility, may support better patient experience and quality improvement in tertiary care hospitals.

KEYWORDS: Hospital wayfinding; Wayfinding signage; Patient satisfaction; Signage audit; Hospital administration; Tertiary care hospital.

INTRODUCTION

Hospitals are integrated systems comprising of diverse services and departments such as outpatient and inpatient, emergency services, diagnostic facilities, pharmacies, laboratories, and administration sections. The expansion in the size of tertiary care hospitals and the complexity of their functions pose challenges to patients and visitors navigating the facility resulting in confusion, reliance on staff assistance and additional stress to the visitors. [1,2]

The term Wayfinding encompasses the behavioural and cognitive processes of a person navigating from one point to another. It includes all the information and visual stimuli, such as spatial information, environmental cues, landmarks, graphics, color, sign, and symbols, that help a person to locate themselves and arrive at their destination. In a hospital

environment, Wayfinding is often complicated by the fact that most people visiting the hospital are not familiar with their surroundings and have to move around several departments, wards, and sections while seeking various services during their short or long stay. [2–4]

Signs constitute an essential Wayfinding component in a hospital. Directional or informative signs enable a visitor or patient to identify places and make route decisions with ease and confidence at decision points and throughout their hospital visit. Several factors contribute towards the effectiveness of signage such as visibility, readability, placement, language, direction information, and use of pictograms among others. The appropriate use of signs contributes immensely to effective communication resulting in a positive patient experience. [1,3–5]

Patient experience is increasingly being recognized as a critical element of performance measurement in healthcare organizations. The experience of patients and their overall impression of the hospital is significantly influenced by their ease in navigating the hospital and the degree to which they find the information helpful. Thus, assessment of signage can play a key role in helping hospital administrators understand the strengths and weaknesses of their Wayfinding system and make the needed improvements for a positive patient experience.

However, despite its centrality, there is a paucity of studies evaluating Wayfinding signs from the objective assessment perspective as well as the patients' and visitors' perspective. An evaluation study of the signage quality accompanying the patient satisfaction survey can provide administrators with the information needed to ascertain whether their perceptions of the quality of the quality of signage corresponds to the reality and the patient satisfaction with the hospital navigation.

Therefore, the current study was conducted at Rajendra institute of Medical Sciences (RIMS) Hospital, Ranchi in order to assess the existing Wayfinding signage system and its association with patient satisfaction and improve the general hospital environment. The study also sought to establish the association between selected signage attributes such as visibility, readability, and language and patient satisfaction.

2. MATERIALS AND METHODS

2.1 Study Design:

A hospital based cross-sectional study was conducted to assess the existing wayfinding signage system in a tertiary care hospital and to determine its association with the overall patient satisfaction. The study assessed the level of the existing hospital wayfinding signage as well as the perception of patients, attendants and visitors towards the effectiveness of the signage system.

2.2 Study Setting and Population:

The study was carried out at Rajendra Institute of Medical Sciences (RIMS), Ranchi, a tertiary care teaching hospital in Jharkhand, India. The study population comprised of adult patients, attendants and visitors attending the different service areas of the hospital. Participants were approached from various hospital locations including outpatient departments, inpatient wards, diagnostic centres, emergency department, registration counters, pharmacy areas and main corridors. The sample was selected from individuals aged 18 years old or older who attempted to visit at least one hospital department and signed an informed consent. Individuals younger than 18 years, hospital employees and healthcare professionals, patients requiring emergency medical assistance, those with extreme cognitive or visual impairment, and those declined consent and those who had participated in the study earlier were excluded.

2.3 Sample Size and Sampling:

A total 400 participants were recruited for the study. A non-probability convenience sampling procedure was adopted as due to the continuous flow of patients and visitors in the hospital and the lack of complete list of the sample frame. Eligible participants fulfilling the inclusion criteria were approached from different hospital locations consecutively till the required sample size of 400 was achieved. Efforts were made to include participants from different hospital service areas in order to improve the representativeness of the study sample and to minimize the selection bias associated with convenience sampling.

2.4 Study Instrument and Administration:

A pre-designed, pre-tested, structured interviewer administered questionnaire was prepared based on detailed literature review and review of relevant national quality indicators, was adopted for the study. The questionnaire comprised into six sections namely: (A) socio-demographic characteristics, (B) hospital visit characteristics, (C) navigation experience, (D) assessment of existing signage, (E) patient satisfaction with wayfinding signage and (F) suggestions for improvement. This questionnaire included tick box questions, multiple choice questions (MCQs), and 5-point Likert scale items. The study assessed various characteristics of the hospital wayfinding signage system including visibility, readability, language, placement and other aspects of signage quality. The study evaluated the level of patient satisfaction using the relevant questionnaire items, with higher scores reflecting more positive perceptions about the effectiveness of the existing hospital wayfinding signage system. The content validity of the instrument was assessed through the opinions of specialists from the fields of Hospital Administration and Public Health. On the other hand, internal consistency reliability was determined by calculating Cronbach's alpha. The patient satisfaction questionnaire had a good internal consistency reliability with a Cronbach's alpha coefficient of 0.869.

2.5 Data Collection and Analysis:

The data was collected from the selected sample after seeking their consent. The collected data were inputted, coded, tallied, and analysed in Microsoft Excel and Jamovi Statistical Software (2.7.37). Firstly the data set was cleaned to

remove any missing values, inconsistencies, and errors. The cleaning process involved checking the distribution of the data set. The statistical package was then used to estimate the means and standard deviations of the continuous variables. The categorical variables were reported using % and frequencies.

An independent sample t-test was performed to compare the average level of satisfaction of the patients with the signage in the hospitals. A one-way analysis of variance (ANOVA) was used to compare the mean satisfaction of the patients with signage information among more than two independent groups. Welch's ANOVA was used when the equality of variance between the groups was not met. In addition, Pearson's correlation analysis was used to examine the nature and strength of the relationship between the wayfinding signage items and the overall satisfaction of the patients with the signage in the hospital. The study further performed a multiple linear regression analysis to examine the predictors of the patients' overall satisfaction with the signage information. The analysis helped establish how much each independent variable contributed to the variation in the dependent variable. The study further used Pearson's chi-square test to examine the associations between the independent and dependent variables..

2.6 Ethical Considerations:

The ethical approval for the study was obtained from the Institutional Ethics Committee prior to the collection of the data. The participation was voluntary and an informed written consents was obtained from the participants. The participants were informed about the purpose and procedure of the study and the confidentiality of the information given by them was maintained.

3. RESULTS

3.1 Participant Characteristics

Table 1. Socio-demographic and hospital-visit characteristics of study participants (N = 400)

Variable	Category	Frequency (n)	Percentage (%)
Age	18-25 years	54	13.5
	26-35 years	148	37.0
	36-45 years	100	25.0
	>45 years	98	24.5
Gender	Male	200	50.0
	Female	200	50.0
Education	Illiterate	3	0.8
	Primary	100	25.0
	Secondary	121	30.3
	Higher Secondary	58	14.5
	Graduate	115	28.7
	Postgraduate	3	0.8
Monthly Income	≤ ₹10,000	186	46.5
	₹10,001-25,000	154	38.5
	₹25,001-50,000	57	14.2
	> ₹50,000	3	0.8
Residence	Rural	168	42.0
	Urban	107	26.8
	Semi-urban	125	31.3
Hospital Location	OPD	71	17.8
	Ward	122	30.5
	Emergency	68	17.0
	SSB	81	20.3
	RIO	58	14.5

Source: Primary data collected from study participants (N = 400).

There were 400 participants were included in the study. The number of participants of two genders was equal, i.e. 200 males and 200 females (50.0% males and 50% females). The largest proportion of participants had completed secondary education (30.3%), followed by graduates (28.8%) and those with primary education (25.0%). Regarding place of residence, 168 participants (42.0%) were from rural areas, 125 (31.3%) were from semi-urban areas and 107 (26.8%) were from urban areas. Nearly half of the participants (46.5%) reported a monthly family income of ≤₹10,000, while 38.5% reported an income of ₹10,001-25,000.

Participants were recruited from five major hospital service areas. The largest proportion was from ward areas (122; 30.5%), followed by SSB (81; 20.3%), OPD (71; 17.8%), Emergency (68; 17.0%) and RIO (58; 14.5%). The largest age group was 26-35 years, comprising 148 participants (37.0%), followed by 36-45 years (100; 25.0%), participants aged above 45 years (98; 24.5%) and those aged 18-25 years (54; 13.5%).

3.2 Reliability and Descriptive Findings of Patient Satisfaction:

The patient satisfaction questionnaire was found to have good internal consistency, with a Cronbach's alpha of 0.869 for six items.

Table 2. Descriptive statistics of patient satisfaction with wayfinding signage (N = 400)

Item	Mean $\pm$ SD
Visibility of signage	4.25 $\pm$ 0.61
Readability of signage	4.24 $\pm$ 0.66
Language used on signage	4.28 $\pm$ 0.59
Placement of signage	3.90 $\pm$ 0.99
Wayfinding assistance provided by signage	3.65 $\pm$ 0.95
Comparison with other hospitals	2.83 $\pm$ 0.88
Overall Satisfaction Score (SAT TOTAL)	23.15 $\pm$ 3.71
Overall Mean Satisfaction (SAT MEAN)	3.86 $\pm$ 0.62

The overall patient satisfaction score was 23.15 $\pm$ 3.71, with an overall mean satisfaction score of 3.86 $\pm$ 0.62. Among the individual signage-related attributes, language received the highest mean score (4.28 $\pm$ 0.59), followed by visibility (4.25 $\pm$ 0.61) and readability (4.24 $\pm$ 0.66). Placement of signage had a mean score of 3.90 $\pm$ 0.99, while wayfinding assistance provided by signage had a mean score of 3.65 $\pm$ 0.95. The item relating to comparison with other hospitals had the lowest mean score (2.83 $\pm$ 0.88).

3.3 Association of Socio-demographic Characteristics with Patient Satisfaction:

Overall patient satisfaction did not differ significantly according to gender. Male participants had a mean satisfaction score of 23.23 $\pm$ 3.75 compared with 23.07 $\pm$ 3.69 among female participants ($t = 0.431$, $p = 0.667$).

Similarly, no statistically significant difference in satisfaction was observed across age groups (one-way ANOVA, $F = 0.322$, $p = 0.810$). Mean satisfaction scores ranged from 22.97 $\pm$ 3.67 among participants aged 26–35 years to 23.40 $\pm$ 3.86 among those aged 36–45 years.

Educational status was also not significantly associated with overall satisfaction ($F = 1.86$, $p = 0.101$).

Overall, the analysis revealed that the examined socio-demographic characteristics did not show statistically significant differences in the terms of patient satisfaction ($p > 0.05$).

3.4 Relationship Between Signage Attributes and Patient Satisfaction:

Pearson's correlation analysis indicated significant positive relationships between the studied signage attributes and overall patient satisfaction. Visibility, readability and language of signage were positively associated with overall satisfaction, with all associations statistically significant relationships at $p < 0.001$.

Table 3. Correlation and multiple linear regression analysis of signage attributes and overall patient satisfaction

Signage attribute	Pearson's correlation with overall satisfaction (r)	Correlation p-value	Standardized regression coefficient (β)	Regression p-value
Visibility	0.778	<0.001	0.265	<0.001
Readability	0.809	<0.001	0.274	<0.001
Language	0.803	<0.001	0.376	<0.001

Model Statistics

$R = 0.854$

$R^2 = 0.730$

Adjusted $R^2 = 0.728$

The final step was a multiple linear regression analysis to evaluate the unique contribution of the selected signage attributes to the overall satisfaction of the patients. The whole regression model was statistically significant ($p < 0.001$) and explained a significant amount of variance in overall satisfaction ($R = 0.854$) with a strong multiple correlation ($R^2 = 0.730$; adjusted $R^2 = 0.728$).

Each of the three attributes included in the model significantly contributed to the overall satisfaction of the patients ($p < 0.001$). A stronger standardized effect was found for the language ($\beta = 0.376$), followed by readability ($\beta = 0.274$), and visibility ($\beta = 0.265$).

3.5 Relationship Between Signage Audit Score and Patient Satisfaction:

The overall signage audit score was positively correlated with the overall patient satisfaction score (Pearson's $r = 0.727$, $p < 0.001$); thus, higher objectively assessed signage quality was linked to higher satisfaction scores of the patients.

Table 4. Correlation between signage audit score and overall patient satisfaction score

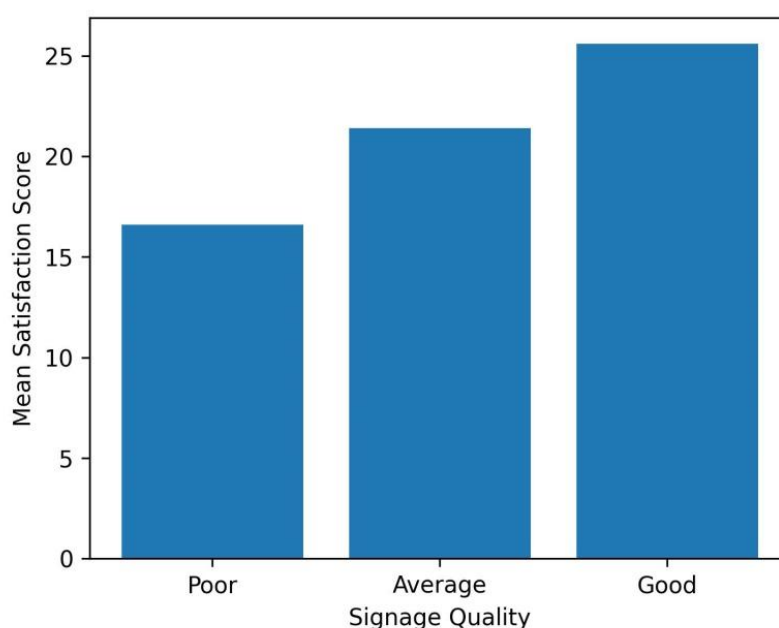
Variables	Pearson's r	p-value
Signage audit score vs. overall patient satisfaction score	0.727	<0.001

Table 5. Patient satisfaction according to hospital wayfinding signage quality classification

A. Comparison of mean satisfaction scores across signage quality classifications

Audit Classification	No. of observations	Mean $\pm$ SD
Poor Signage	19	16.6 $\pm$ 4.15
Average Signage	190	21.4 $\pm$ 2.72
Good Signage	191	25.6 $\pm$ 2.52

Test	F-value	p-value
Welch ANOVA	150.0	<0.001



B. Association between signage quality classification and patient satisfaction level

Signage Audit Classification	Not Satisfied, n (%)	Satisfied, n (%)	Total, n (%)
Poor	18 (94.7)	1 (5.3)	19 (100.0)
Average	167 (87.9)	23 (12.1)	190 (100.0)
Good	29 (15.2)	162 (84.8)	191 (100.0)
Total	214 (53.5)	186 (46.5)	400 (100.0)

Pearson's chi-square test: $\chi^2 = 216.059$; $df = 2$; $p < 0.001$.

Note: Participants with an overall mean satisfaction score < 4.00 were classified as "Not satisfied," whereas those with a score ≥ 4.00 were classified as "Satisfied."

When participants were categorized according to signage audit quality, mean satisfaction scores increased progressively with signage quality. Participants exposed to poor-quality signage had a mean satisfaction score of 16.6 ± 4.15 , compared with 21.4 ± 2.72 among those exposed to average-quality signage and 25.6 ± 2.52 among those exposed to good-quality signage. The difference between the three groups was statistically significant (Welch ANOVA, $F(2,47.5) = 150.0$, $p < 0.001$). Pairwise post-hoc comparisons depicted statistically significant differences between all three groups ($p < 0.001$ for all comparisons).

A statistically significant association was also observed between hospital wayfinding signage quality classification and patient satisfaction level ($\chi^2 = 216.059$, $df = 2$, $p < 0.001$).

4. DISCUSSION

The present study assessed the quality of hospital wayfinding signage and examined its relationship with patient satisfaction in a tertiary care hospital. The findings demonstrated that overall patient satisfaction was strongly associated with key characteristics of wayfinding signage, particularly visibility, readability and language. In addition, higher

objectively assessed signage quality was associated with higher patient satisfaction. Together, these findings indicate that the effectiveness of a hospital wayfinding system depends not merely on the presence of signage, but also on the extent to which signs are visible, readable, understandable and appropriately designed to support navigation.

The study did not demonstrate statistically significant differences in overall patient satisfaction according to gender, age, educational status, monthly family income, place of residence or hospital service area. This suggests that perceptions of the wayfinding signage system were broadly similar across the socio-demographic groups included in the study. Previous research has also emphasized that wayfinding difficulties can affect a wide range of users because healthcare facilities are often complex and unfamiliar environments, although individual characteristics such as familiarity, literacy and visual ability may influence specific navigation experiences. [3,6,7]

The findings demonstrated variation across individual signage attributes. Language received the highest satisfaction rating, followed closely by visibility and readability. In contrast, satisfaction with the placement of signage and the helpfulness of signage in reaching the intended destination was comparatively lower. This distinction is important because a sign may be visible and readable but may still fail to adequately support navigation if it is not positioned at an appropriate decision point or does not provide sufficient directional continuity. Previous studies have similarly emphasized that effective healthcare wayfinding depends on the combined influence of language, typography, contrast, placement, symbols and directional logic. [4,10]

Visibility, readability and language were all strongly and positively correlated with overall patient satisfaction. Among these attributes, readability demonstrated the strongest correlation with satisfaction, followed by language and visibility. These findings support previous evidence indicating that characteristics such as contrast, complexity, text and standardized graphical information can influence users' comprehension of healthcare signage. [1,2,11] The findings also suggest that simply making a sign physically noticeable may not be sufficient; the information presented must also be easy to read and interpret.

Multiple linear regression analysis further demonstrated that visibility, readability and language were significant predictors of overall patient satisfaction and collectively explained 73.0% of the variance in satisfaction scores. Language demonstrated the strongest standardized predictive contribution, followed by readability and visibility. This finding highlights the importance of understandable and accessible language in hospital wayfinding, particularly within a healthcare environment serving individuals with different linguistic and educational backgrounds. Previous literature on multilingual healthcare communication has similarly identified language accessibility as an important component of patient access to information. The findings are also consistent with an Indian study on the implementation of wayfinding signage in a tertiary public hospital, which highlighted the practical importance of multilingual information, placement, visibility and pictographic elements in improving hospital navigation. [12,13]

An important strength of the present study was the inclusion of an objective assessment of signage quality through a structured signage audit in addition to the assessment of patient perceptions. A strong positive correlation was found between the signage audit score and the overall patient satisfaction. This convergence between objective assessment and user perception suggests that better performance on the assessed signage quality indicators was associated with greater satisfaction among patients and visitors.

The relationship between signage quality and patient satisfaction was further supported by the comparison across signage audit classifications. Participants exposed to good-quality signage reported substantially higher satisfaction than those exposed to average- or poor-quality signage, and statistically significant differences were observed between all three groups. Similarly, the chi-square analysis also showed that the quality of signage was associated with satisfaction level. The proportion of participants classified as satisfied increased markedly across the signage quality categories, from 5.3% among those exposed to poor-quality signage to 84.8% among those exposed to good-quality signage. These findings reinforce the importance of signage quality as a factor associated with patient satisfaction and are consistent with previous research indicating that standardized, visible and comprehensible signage can improve the usability of healthcare environments. [1,4,10,13]

The findings have important implications for hospital administration and quality improvement. A wayfinding system should be regarded as a component of the patient experience rather than merely as a collection of individual signs. Improvement efforts should therefore focus on maintaining clear and understandable language, adequate readability and visibility, appropriate placement at decision points and continuity of directional information throughout the hospital. The structured signage audit used in the present study may also provide a practical approach for periodically identifying deficiencies and monitoring the quality of the wayfinding environment. Regular auditing is particularly important when hospital departments are relocated, expanded or renovated.

However, the results should be seen from the perspective of design of the study. It is cross sectional and therefore, the observed correlations and regression relationships demonstrate statistical associations within the study population but do not establish causality. Therefore, although higher signage quality was associated with greater patient satisfaction, the study cannot establish that improving a specific signage attribute would necessarily produce a corresponding increase in satisfaction. Longitudinal and interventional studies would be useful for examining the effect of specific wayfinding improvements on patient experience and navigation outcomes.

5. CONCLUSION

The results of study showed that there is a positive connection between the level of hospital wayfinding signs and the degree of satisfaction of the RIMS hospital patients. The visibility, readability, and language of signs were significantly associated with patient satisfaction. Moreover, the analysis revealed that language was the most significant predictor among the evaluated aspects. In addition, a positive association between the audit score and satisfaction was found, with

participants who saw good signs being much more satisfied with the level of signage than those who saw average or poor signs.

It can be concluded that patient satisfaction with hospital wayfinding signs plays a critical role in healthcare institutions as it is a vital element of the patient experience and an important aspect of quality improvement. Signs should be provided in sufficient quality, meaning that they should not be hard to see, read, understand, or locate. This study can help hospitals recognize the importance of wayfinding signage in their institutions and continuously improve their level of signage to ensure high quality of patient experience.

LIMITATIONS

The results of the research should be interpreted considering several limitations associated with the study. Firstly, this study was based on a cross-sectional design thus the findings can only show association between wayfinding signs quality and patient satisfaction and not causation. Secondly, the study used convenience sampling making it difficult to generalize the finding for all the users of the hospital. Thirdly, the study was carried out in one hospital thus the findings may not be generalized in other hospitals with varying topography and patient demographics. Lastly, the study relied on self-reported data to determine patient satisfaction and perception thus skewing the results due to expectations, previous experiences and subjective bias among the patients.

Ethics Approval

The study received approval from the Institutional Ethics Committee of Rajendra Institute of Medical Sciences, Ranchi (Letter No. 59/IEC, RIMS, dated 24.02.2026). Written informed consents were obtained from all the participants before their inclusion in the study. The participants were also informed verbally that they could withdraw from the study at any time and the information they provide would remain confidential.

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Conflict of interest

The author declares that no conflicts of interest exists.

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REFERENCES

1. Rousek JB, Hallbeck MS. Improving and analyzing signage within a healthcare setting. *Appl Ergon*. 2011;42(6):771-784.
2. Rousek JB, Hallbeck MS. The use of simulated visual impairment to identify hospital design elements that contribute to wayfinding difficulties. *Int J Ind Ergon*. 2011;41(5):447-458.
3. Iftikhar H, Shah P, Luximon Y. Human wayfinding behaviour and metrics in complex environments: a systematic literature review. *Archit Sci Rev*. 2021;64(5):452-463.
4. Yesiltepe D, Conroy Dalton R, Ozbil Torun A. Landmarks in wayfinding: a review of the existing literature. *Cogn Process*. 2021;22:369-410.
5. Sahoo KC, Tamhankar AJ, Johansson E, Lundborg CS. Challenges to hospital wayfinding in Indian public healthcare facilities: a qualitative study. *BMC Health Serv Res*. 2019;19:693.
6. National Accreditation Board for Hospitals and Healthcare Providers. Accreditation Standards for Hospitals. 5th ed. New Delhi: Quality Council of India; 2020.
7. Bastemeijer CM, Boosman H, van Ewijk H, Verweij LM, Voogt L, Hazelzet JA. Patient experiences: a systematic review of quality improvement interventions in a hospital setting. *Patient Relat Outcome Meas*. 2019;10:157-169.
8. Ulrich RS, Zimring C, Zhu X, DuBose J, Seo HB, Choi YS, et al. A review of the research literature on evidence-based healthcare design. *HERD*. 2008;1(3):61-125.
9. Rodrigues R, Coelho R, Tavares JMRS. Healthcare signage design: a review on recommendations for effective signing systems. *HERD*. 2019;12(3):45-65.
10. Greenroyd FL, Hayward R, Price A, Demian P, Sharma S. A tool for signage placement recommendation in hospitals based on wayfinding metrics. *Indoor Built Environ*. 2018;27(7):925-937.
11. Hsueh-Hua H, Choi YS, Lin CC. Comprehensibility of universal healthcare symbols for wayfinding in healthcare facilities. *Appl Ergon*. 2014;45(4):878-885.
12. Schuster M, Elroy I, Elmakais I. We are lost: measuring the accessibility of signage in public general hospitals. *Lang Policy*. 2017;16(1):23-38.
13. Sahoo KC, et al. Implementation of wayfinding signage in public hospitals and its evaluation towards quality improvement. *Cureus*. 2024;16(8):e65435.

14. Bubric K, Harvey G, Pitamber T. A user-centered approach to evaluating wayfinding systems in healthcare. *HERD*. 2021;14(1):19-30.
15. Rodrigues R, Coelho R, Tavares JMRS. Users' perceptions of signage systems at three Portuguese hospitals. *HERD*. 2020;13(4):178-192.
16. Cheng AC, White J. Using wayfinding data to understand patient travel within a medical center. *AMIA Annu Symp Proc*. 2018;2018:1216-1223.
17. Bromley E. Building patient-centeredness: hospital design as an interpretive act. *Soc Sci Med*. 2012;75(6):1057-1066.
18. Huisman ERCM, Morales E, van Hoof J, Kort HSM. Healing environment: a review of the impact of physical environmental factors on users. *Build Environ*. 2012;58:70-80.
19. Verderber S, Fine DJ. Healthcare architecture as a form of patient-centred design. *HERD*. 2010;3(3):3-7.
20. Joseph A. The impact of the environment on infections in healthcare facilities. *HERD*. 2006.
21. Hamilton DK, Watkins DH. *Evidence-Based Healthcare Design*. Hoboken: Wiley; 2009.
22. Stichler JF. Healing by design: healing environments for the elderly. *HERD*. 2008;1(4):8-14.
23. Huisman ER, Morales E, van Hoof J, Kort HSM. A review of the impact of healthcare environmental design on patient outcomes. *HERD*. 2012;5(2) .
24. Rechel B, Wright S, Edwards N, Dowdeswell B, McKee M. Investing in hospitals of the future. Copenhagen: World Health Organization Regional Office for Europe; 2009.
25. World Health Organization. Quality of care: a process for making strategic choices in health systems. Geneva: WHO; 2006.
26. World Health Organization. Framework on integrated, people-centred health services. Geneva: WHO; 2016.
27. Ministry of Health and Family Welfare, Government of India. Kayakalp: National Guidelines for Clean Hospitals. New Delhi: MoHFW; 2015.
28. Ministry of Health and Family Welfare, Government of India. Kayakalp Assessment Tool for Public Health Facilities. New Delhi: MoHFW; 2021.
29. Ministry of Health and Family Welfare, Government of India. Indian Public Health Standards: Guidelines for District Hospitals (101-500 Beds). New Delhi: MoHFW; 2022.
30. Ministry of Health and Family Welfare, Government of India. National Quality Assurance Standards for District Hospitals. New Delhi: MoHFW; 2016.
31. Quality Council of India. National Accreditation Board for Hospitals and Healthcare Providers: Accreditation Standards for Hospitals. New Delhi: QCI; 2020.
32. Bureau of Indian Standards. National Building Code of India 2016. New Delhi: Bureau of Indian Standards; 2016.
33. National Disaster Management Authority. Guidelines for Hospital Emergency Preparedness and Response. New Delhi: Government of India; 2016.
34. Australian Commission on Safety and Quality in Health Care. Patient-centred care: improving quality and safety through partnerships with patients and consumers. Sydney: ACSQHC; 2011.
35. Victorian Government Department of Health. Wayfinding and signage guidelines: improving the patient experience program. Melbourne: State Government of Victoria; 2009.
36. Annemans M, Stam L, Coenen J, Heylighen A. How can research on patient experience inform hospital design? A case study on improving wayfinding. In: *Proceedings of the Design Research Society Conference*; 2016.
37. Short EJ, Reay SD, Douglas RA. Designing wayfinding systems in healthcare: from exploratory prototyping to scalable solutions. *Design Health*. 2019;3(1):180-193.
38. Mourshed M, Zhao X. Healthcare providers' perception of design factors related to physical environments in hospitals. *J Environ Psychol*. 2012;32(2):105-117.
39. Zimring C, Joseph A. The role of the physical environment in the hospital of the future. *HERD*. 2008;1(1).
40. Leather P, Beale D, Santos A, Watts J, Lee L. Outcomes of environmental appraisal of different hospital patient areas. *Environ Behav*. 2003;35.
41. Sahoo KC, Tamhankar AJ, Johansson E, Lundborg CS. Wayfinding challenges in public hospitals and implications for healthcare design



INSTITUTIONAL ETHICS COMMITTEE
RIMS, RANCHI
Jharkhand - 834009
IEC Reg. No – ECR/769/INST/JH/2015/RR-21

ETHICS COMMITTEE FINAL APPROVAL LETTER

Letter No. 59

Date 24/02/2026

1. Dr. Birendra Kumar Roy
Chairperson

2. Dr. Umashanker Prasad
Keshri
Member Secretary

3. Dr. Sanjay Kumar Singh
Clinician

4. Dr. Pradip Kumar
Bhattacharya
Clinician

5. Dr. Mrityunjay Mundu
Clinician

6. Dr. Arpita Rai
Clinician

7. Dr. Manju Gari
Medical Scientist

8. Dr. Anupa Prasad
Medical Scientist

9. Dr. Satish Chandra
Scientific Member

10. Dr. Shashi Bhushan Singh
Scientific Member

11. Mr. Sanjay Kumar Sharma
Legal Expert

12. Mr. Sidharth Tripathi
NGO Representative

13. Mrs. Neelam Rani
NGO Representative

14. Mr. Aklu Mahto
Lay Person

To,
Dr. Rishabh Mishra
PG-MHA (2025-26),
Department of Hospital Administration,
RIMS, Ranchi.

Dr. (Major) Sourabh Kumar
Guide,
Associate Professor,
Department of Anaesthesiology,
RIMS, Ranchi

Reference: Your application for Ethics Approval of the Synopsis.

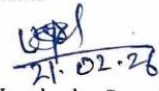
Synopsis Title: "Assessment of Way Finding Signage in a Tertiary Care Hospital and its Evaluation Towards Quality Improvement"

Dear Sir/Madam,

With reference to your Synopsis Submission no. – S/75/26, Titled "Assessment of Way Finding Signage in a Tertiary Care Hospital and its Evaluation Towards Quality Improvement" after detailed discussion, the Institutional Ethics Committee accords the final approval.

You must inform the IEC of the following: -

1. Protocol amendment in the IEC specified format.
2. The Occurrence of Serious Adverse Events (SAE)/AE/ Protocol violations and / or Death, during the study period, in the IEC specified format.


24.02.26
Dr. Umashanker Prasad Keshri
Member Secretary
Institutional Ethics Committee
RIMS, Ranchi.

Secretary
Institutional Ethics Committee
Rajendra Institute of Medical Sciences
Ranchi