

DESIGNING A HOSPITAL SIGNAGE GUIDANCE SYSTEM USING ENVIRONMENTAL DESIGN ELEMENTS

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ABSTRACT

This project analyses hospital signage and navigation systems utilising the collaborative design. It's a new "human-centered" design theory. Community design provides equal, safe, and easy access to the medical environment for all, especially for hospital patients with special needs. In medical facilities, the communal design lets us build passenger flow-directing systems and better signs and guides. Design thinking drives medical signage and counselling. Second, it provides a framework for constructing medical institution signage and orientation systems based on audience needs, signage placement, and environmental design. Applying this design theory and approach to medical institution signs and guiding systems increases audience, sign recognition, patient guidance, treatment flow optimisation, and efficiency. A case study examined the Second People's Hospital of Henan Province's signage and guiding system, patients' physiological and psychological qualities, and their needs and expectations. This project studies and implements signage and guidance system design guidelines. This new initiative aims to encourage researchers and professionals to utilise the common design and present more effective design examples.

Keywords: Environmental Design Elements, Shared Design Theory, User perception, Signage Guidance, Design Approach

INTRODUCTION

Customer-oriented hospital signage. Medical facilities' environmental, medicinal, and service needs rise with material and cultural living levels. The building scale of medical institutions is expanding, the spatial structure is becoming more complex, the functional structure is becoming more elaborate, and the medical equipment is becoming more complete, which meets people's medical needs but causes a lot of inconvenience, such as various departments and traffic flow lines that make it difficult for patients in a hurry to identify the relevant department at medical institutions, the signage guidance.

China's hospital signage and guidance system design research started late and is still experimental compared to industrialised European countries. This study used domestic and foreign research skills. Environmental design features in hospital signage systems and shared design as a theoretical foundation for medical institution signage and guide systems are novel and relevant. Hospital signage integrates audience needs, environmental considerations, and environmental design: What are the design guidelines for hospital signs and guiding systems? The hospital's audience and environment? iii) How does hospital identification use environmental design?

PROBLEM STATEMENT

Lack of colour coordination hurts patients' mental health (Yang & Meng, 2018) and makes healthcare navigation difficult. However, signpost management, quality, pointing, and direction identification are poor (Wang & Lu, 2019), which makes patients worry about the hospital's medical standard. The medical space environment is not designed for old people, so senior patients often feel unsafe and unmotivated upon entering the hospital and have trouble locating and recognising their destination. Hospitals are stern and stressful (Shi, 2020). Children cry and parents are terrified during consultations, and confusion can lead to negative emotions, medical concerns, and doctor-patient disagreements, making developing a medical care system for children challenging (Shen, 2021).

As hospital buildings improve, patient admittance, prosecution link, and consultation complexity develops, and patients' demand for medical services rises, the hospital environment's signals and guidance system becomes crucial to the hospital market strategy. Thus, good guiding signs boost the hospital's reputation, simplify patient visits, and improve medical services. (Wei, 2019). This project uses shared design theory and principles to analyse and study medical institution signage systems from three perspectives: audience needs, signage settings, and environmental design elements in hospital signage design, providing methodological guidance for the final case design and summarising existing problems using observation methods and questionnaires.

FIELD SURVEY OF HOSPITAL SIGNAGE SYSTEMS

Signs and instructions must be scientifically designed and classified. Hospitals classify practise recommendations by patient location and reading patterns, from large to small, inside to outside, and first to last. As shown in Table 1, hospital signage is classified by function into four stages.

Table 1. The principle of sign-oriented classification in hospitals

Grading diagram of hospital signage guidance system			
A	B	C	D
First-level identification <ul style="list-style-type: none"> • Hospital name/gate identification • Hospital road guide • Hospital road triage identification 	Secondary sign guidance <ul style="list-style-type: none"> • General index of hospital floors • Hospital floor index and plane hospital • Hospital hallway 	Three-stage sign guidance <ul style="list-style-type: none"> • Every medical unit in the hospital • Each nursing unit • Administrative/logistics unit 	Four-level sign orientation <ul style="list-style-type: none"> • The room number • Window card

<ul style="list-style-type: none"> • Hospital services • Names of hospital buildings • Hospital outdoor general plan • Hospital outdoor image logo 	<ul style="list-style-type: none"> • sign • Hospital public service facilities • Entrance and exit guidance • Expert introduction column • Information bar • Medical and education propaganda column 		
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First-level signage (see Figure 1 & 2): The first-level guidance system belongs to outdoor guidance signs, and the first-level guidance of the Second People's Hospital of Henan Province is the core of the whole signage system design. The systemic nature of the guidance design.



Figure 1. Building Sign



Figure 2. Outdoor sign

Secondary signs (see Figure 3 & 4): Secondary signs are generally placed in a prominent position at the entrance of each floor, including the general floor plan and the floor plan of each floor, etc.



Figure 3. Floor Master Index



Figure 4. floor unit sign

Three-tiered signs: Hospitals employ three-level guiding signs most often and accurately. Medical, nursing, and administrative logistical units utilise them to indicate their locations. Visitors feel uneasy without a consistent colour palette. Complex and diversified, the ground logo disorients. The children's clinic's colouring palette is overly feminine and monochrome.



Figure 5. Departmental signage

The four-level orientation (As shown in Figure 6) has many common problems with the three-level orientation, such as more unified form beauty, incomplete icon design and concise design.



Figure 6. Room door signs and other environmental signage

ANALYSIS OF HOSPITAL SIGNAGE AND GUIDANCE SYSTEM AUDIENCES

A random sample of participants completed a questionnaire regarding the Second participants's Hospital of Henan Province's signage system issues. 159 questionnaires were analysed. As a result, 29 patients found the destination using the sign-guiding system, 71 patients used the sign-guiding system after asking others, 39 patients arrived by asking others, and 20 patients looked for it themselves. The staff's medical treatment would be affected by identification guidance's adequacy. 90 of 159 respondents believe identifying information is imperfect; 69 individuals say the logo's information is too extensive and disorganised, affecting viewing; 73 persons believed the sign system's equipment wasn't adequate; 63 thought the information was unclear and misleading; 28 considered the sign's orientation was illogical; and 15 said the labelling system was ugly and affected medical treatment mood.

Summary of data analysis shows that the signage and guidance system of the Second People's Hospital of Henan Province has many loopholes, such as imperfect information, missing and inconspicuous guidance signs, etc., which negatively impact patients' access to medical treatment and dissatisfy people. Four issues plague the Second People's Hospital in Henan Province:

i) Insufficient signs and guidance

The Second People's Hospital of Henan Province's signs guidance system has many missing difficulties, notably in the space transformation location, and lacks consistency, making it difficult to guide. The signs' colours vary, and they're hard to recognise. The signage guide is also inconsistent, impeding everyday use.

ii) Low sign recognition

The Second People's Hospital of Henan Province's signage system has low legibility due to its location, such as the car park and entrance signs being blocked by the janitorial duty room, some outdoor signs being blocked by trees, and some being blurred.

iii) Unfriendly design

The Second People's Hospital in Henan Province lacks disability signs. For example, although the hospital has special signage for wheelchair users in lifts and medical corridors, the proportion and height of the signage are not perfect, so disabled people cannot easily access

the signage information, and the hospital has not configured signs with a bumpy touch to allow disabled patients to recognise them.

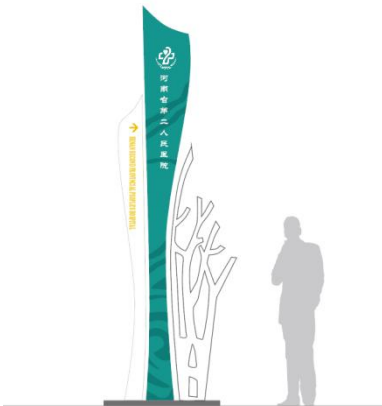

iv) Lack of connections to new media


The Second People's Hospital of Henan Province uses graphic design to communicate with patients. Traditional signs and advice involve passive information prompting and lack active reflection.

BASIC IDEAS DEVELOPMENT

According to the research and analysis results of the signage guidance system of the Second People's Hospital of Henan Province, the author has made a relevant optimisation design case, based on the "people-oriented" design idea, using the principle of shared design, applying natural environment graphics to signage design, using abstract architectural forms and figurative plants, water, and other elements. Abstract building forms and realistic natural elements like plants and water break up geometric shapes and provide beauty. To benefit all users and be utilised equitably, first-level guide signs should be designed using the common design concept of fairness (Table 2).



Table 2. Sketch of a primary directional signage design

Design sketches	Contents
 <p data-bbox="263 1523 582 1556">Hospital entrance signage</p>	<p data-bbox="646 1070 1404 1344">Hospital name and tagline dominate primary entryway signage. The building structure is twisted into a gentle streamline shape on the left and centre, while the right employs a figurative plant shape to symbolise vitality. The shape represents the hospital-patient interaction. Green and white, environmental colours, follow the common design philosophy and fit public aesthetics. Spray-painted stainless steel was utilised for exterior signs.</p>
 <p data-bbox="279 1859 566 1892">Parking signs Outdoor</p>	<p data-bbox="646 1568 1404 1769">To aid orienting, vehicle park signs are deformed 'P's. The plant element at the bottom gives the signs system coherence and consistency, and the design style of figurative environmental components replaces the uninteresting geometric shape. Patients can notice the warning yellow lettering with an English label.</p>

 <p style="text-align: center;">Road diversion signs</p>	<p>Bifurcations or entrances to key thoroughfares have traffic detour signs. The general colour scheme is green and white, while the directional signs are black and white, with white backgrounds and black Chinese and English letters to match people's writing and reading habits.</p>
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Secondary guiding signs include floor plan, floor index, bulletin board, channel, and entrance/exit index signs. Signage is typically at floor lobbies, critical routes, and other intermediate locations. Secondary guidance indicators should follow the common design principles of simplicity, intuition, and adaptability (Table 3).

Table 3. Sketch of secondary directional signage design

Design sketches	Contents
 <p style="text-align: center;">Hospital floor master index sign</p>	<p>The universal floor index sign is a display stand at each building's main entrance for persons with diverse physical problems. The external design uses the 'water wave' motif to enhance creativity. The signage mostly contains floor plans and a hospital introduction. To expedite patient identification, the Second People's Hospital of Henan Province's signage divides each floor's medical, office, research, and living spaces by colour.</p>
 <p style="text-align: center;">Wall mounted floor index sign Floor markings</p>	<p>Each level's main entrance has an acrylic panel UV spray-printed floor sign that matches external signage. The landscape pattern enhances the hospital space and cheers up patients. The floor signs' major purpose is to rapidly assist people to their destinations, therefore they suitably enhance the size of the text and arrows to help patients quickly obtain guidance information, reflecting the humanised design here.</p>





Medical, nursing, administrative, logistical, and functional rooms are the key tertiary guidance signals. Each floor's primary traffic paths have tertiary guiding indicators (Table 4).

Table 4. Sketch design for tertiary directional signage

Design sketches	Contents
 <p data-bbox="336 450 687 483">Medical unit guidance signs</p>	<p data-bbox="842 286 1391 768">The floor signage is hanging aluminium alloy with a baked-on finish and built-in LED lights. Each unit area hanging sign still uses environmental design elements in the overall style, the main visual guide is the text in the signage guide sign, equipped with English, adding the iconic symbol of arrow, in the visual effect to make the signage guide more oriented, the sharp arrow symbol pulls the viewer's sight direction, the movement force will gradually increase, from the base gradually towards the peak state, in this movement guide function of the sign.</p>
 <p data-bbox="347 719 676 752">Service unit identification</p>	

Room door signs, patient beds, and service windows make up the four guide sign levels. They are mostly on service window and department doors (Table 5).

Table 5. Sketch design for level 4 directional signage

Design sketches	Contents
 <p data-bbox="395 1335 639 1368">Ward door signage</p>	<p data-bbox="829 1379 1391 1704">To simplify information, the four levels of signage are personalised in a common manner using visual symbols based on functional space features. The flexibility and simplicity of disassembly and replacement of door and bed signs were also considered, and it was decided to employ hanging and extractable signage design solutions that are easy to change.</p>
 <p data-bbox="395 1514 639 1547">Departmental logo</p>	
 <p data-bbox="363 1765 676 1798">Environmental labelling</p>	
 <p data-bbox="419 1977 619 2011">Reminder signs</p>	

RESULTS

In China, patients' navigation challenges vary depending on the hospital's layout, size, and atmosphere. First, patients don't know where they're going in the hospital. Second, they know where they're going but can't get there owing to spatial cognitive impairment (Hao & Lin, 2021). Thus, taking into account the physiological and psychological needs of the users, a clear and eye-catching signage guidance system should be configured indoors and outdoors to create a suitable space environment, improving patient consultation efficiency and solving the problem of patients getting lost.

This project employs a shared design approach to tackle hospital signage system issues found in literature. Using the Second People's Hospital of Henan Province as a case study, field research and audience questionnaires identified the signage system's main issues. The principles of shared design are studied to understand the methods used to design the signage system; the audience needs and signage settings in the medical environment are analysed to understand the basic needs, rules, and methods for designing the hospital signage and guidance system; and the types of environmental design elements are analysed and applied to the design of the system. The validity and practicality of this paper's ideas and techniques are proven by the study and design of the Second People's Hospital of Henan Province's signage and guiding system, offering reference for other medical institutions.

Results of a study on the current state of design of signage and guidance systems in medical institutions

Table 6. Current status of hospital signage system design

A study of the literature relating to the design of hospital signage systems	Study of the signage system of the Second People's Hospital of Henan Province
The signage design is not integrated with medical lines and lacks systematic planning; the colour of the guide lacks coordination and affects patients' psychological health; the level of signage management is poor, the quality of the signage varies, the signage is not clear, and the signage is difficult to identify; and the medical space environment does not take special groups into consideration and lacks humanity.	Incomplete signage guiding system; low signage recognition; unfriendly design; no new media references.

Research findings on the design methodology of hospital signage and guidance systems

Table 7. Common design principles

Design for commonality principles			
Principle of fairness	The principle of flexibility	The principle that information is easily accessible and understandable	The principle of reasonable spatial dimensions

Research findings on the application of environmental design elements in the design of hospital signage and guidance systems

Figure 20 illustrates how graphics, colours, textures, and shapes may help hospital patients find their way and understand where they are in respect to the destination location. The graphic and symbolic use of architecture and nature in a hospital's signage system may enrich the character of each region, guide attendance, and create a visual centre.

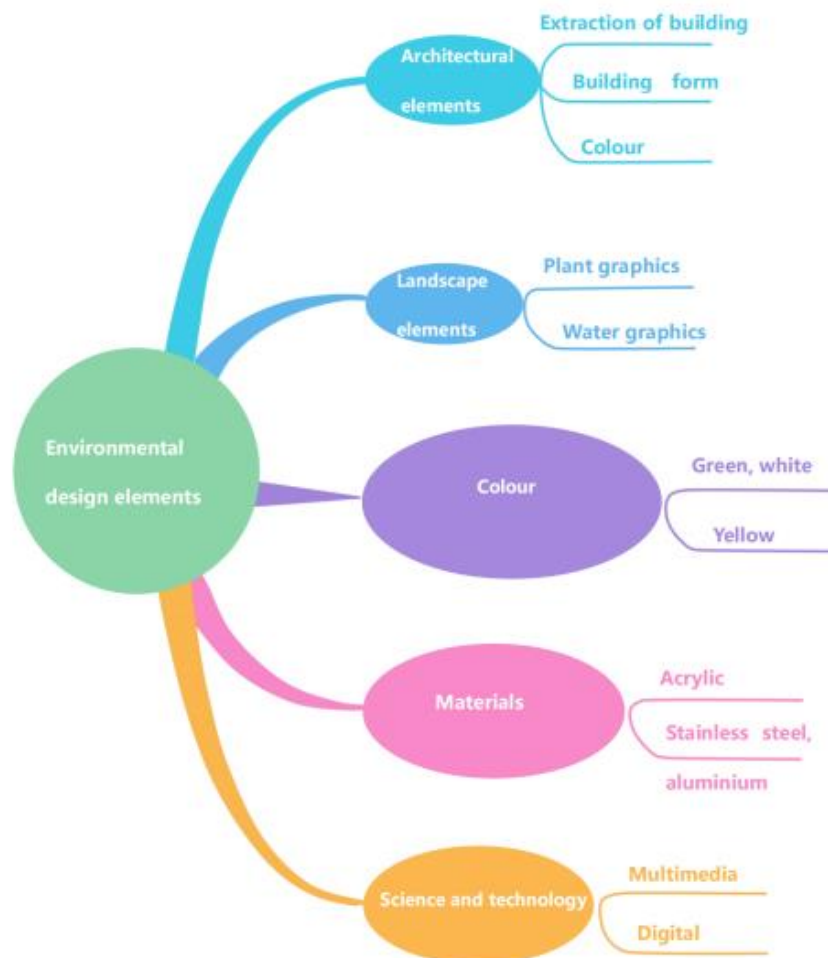


Figure 7. Extraction of environmental design elements

The above research uses spatial environment and signage system aspects to create a pleasant

medical setting. The signs are placed in suitable areas according to audience demands, maximising their guide function, ensuring a smooth trip to the hospital, reducing patient anxiety, and enhancing hospital efficiency.

DISCUSSION

Hospital signage is a human-centered design, and communal design meets the requirements of all users, making it socially caring and harmonious (Li, 2019). Hospitals have complicated populations, and shared design principles prove human-centered design. Environmental design elements recombine, remove, and choose appropriate visuals. The diagnosis and treatment area is full with symbols. Symbolic components like images, colours, forms, and materials in the environment should be ordered and blended to fulfil distinct roles for effective and orderly functioning (Zheng & Liu, 2022). A research of environmental design elements indicated that using elements in the spatial environment improves signs system spatial orientation and integrates people and nature, creating a comfortable healthcare setting.

This study uses "human-centered design" to fully investigate hospital patients' behaviour and needs and change previous medical institutions' signage and guidance systems, which only focused on aesthetics or culture. Medical institution signage serves the cognitive demands of regular individuals and special groups due to its common design. The hospital signage system sensibly divides functional sections using environmental features, helping consumer groups learn about, use, and exchange medical resources. Digital multimedia dynamic advice signs keep patients and clinicians up to date on medical breakthroughs. This study lacks creative signage system material research, therefore it cannot absorb and analyse good home cases.

A good visual orienting system keeps the patient bewildered in strange circumstances. This article analyses medical institution signage and guiding systems using the notion of shared design to guide the medical process and make patient access more scientific, orderly, and efficient. Combining environmental design elements with the hospital's signage system will not only improve the confusing phenomenon of medical institutions' signage and guidance systems, which are generally hard to identify, weak in guidance, unclear in direction, and unreasonable in location, but also improve patient efficiency and satisfaction, optimise medical treatment, improve the medical environment, and improve medical quality. Optimising signage and guidance system design may assist medical institutions build their own image, promote better and quicker growth, and represent passenger flow guidance system development needs. Environmental design features in medical institution signs and guiding systems give reference for other medical institutions and other goods or settings. Technology will make remote hospitals, private physicians, and intelligent inter-temporal guiding systems common in medical facilities.

CONCLUSION

This study develops hospital signage and navigation systems using human-centered and shared design. The Second People's Hospital of Henan Province's signage and guidance system is analysed and optimised to verify the rationality and feasibility of the methods and theoretical results, providing a reference for future standards and specifications for shared signage and guidance systems. This study influences signage and guidance system design. Environmental design may make medical facilities more frequent to meet more demands. It guides visitors, optimises patient flow, and streamlines operations. Signage and guidance are included.

Technology, carrier materials, and creative expression have improved signs and navigation systems, while new media has expanded design space. Studying medical signals makes them more humane, methodical, ecological, and intelligent. Environmental and shared design can organise medical facilities' functional parts to enable consumers learn, utilise, and share medical resources. Globalisation influences economic, cultural, and social progress, and design reflects a country's current culture and technology.

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