ISSN: 1999-1630

SEU Journal of Science and Engineering, Vol. 13, No. 1, June 2019

Wayfinding experience in healthcare: Investigation of the factors contributing to visitors' wayfinding experience within a hospital complex

Zareen Jahan Khan[1]

[1]*Department of Architecture, Southeast University, Dhaka, Bangladesh, E-mail: zareenjk.seu@gmail.com*

Abstract

Wayfinding is one of the essential parameters to enhance the patient experience within a healthcare complex. When the patients and visitors come to the hospital, they are usually in a state of stress and anxiety. Insufficient information makes the situation more difficult for them to find their way to the desired location which may affect their physical and mental health condition. As a result of the fact, the patients develop a negative perception about the quality of care of the hospital. Patients from different locations often visit the BSMMU (Bangabandhu Sheikh Mujib Medical University) hospital which is one of the renowned public hospitals of Dhaka city. It is observed that the wayfinding problem is quite acute in this hospital as well. This study investigates the wayfinding experience of the visitors from entrance to a particular building block within the BSMMU hospital complex. The study is mainly based on observation and questionnaire survey to investigate the existing spatial layout, existing wayfinding condition and identify the factors that affect the visitors' experience while finding their destination respectively. The result shows how different factors related to signage have a close relationship with the overall wayfinding experience of them and among them which factor has the most significant impact. The findings of this study will encourage the planners, architects and policy makers to feel the necessity of better wayfinding and to take immediate steps implementing them which will eventually help the users to avoid any unwanted situation while finding their destination and provide better accessibility.

Keywords: wayfinding, healthcare, signage, destination, accessibility

I. Introduction

Wayfinding is undoubtedly a very important issue in case of hospital design which should be addressed with top priority. Often, the first challenge for visitors in achieving this goal is simply being able to find their way around the facility. In many cases, people find it difficult to perform wayfinding tasks in an unfamiliar environment because they are not provided with adequate information. The main reason for environments being too complex to facilitate wayfinding is a deficiency of clues or 'place legibility' (Raubal and Egenhofer 1998). They either lack enough wayfinding information or the 'place legibility' is poorly designed and therefore not readable. Good wayfinding promotes healing, fiscal health and also improves the patients' perception in the healthcare facilities.

In Lawton (1994), a self-report measure of wayfinding anxiety found that participants who reported a greater use of orientation strategies also reported a lower level of wayfinding anxiety. Getting lost and feeling disorientated will add to their worry and cause further stress. The more stressed people get, the less information they will be able to take in. If the site is not accessible to everyone, people are being discriminated against and may feel, literally, excluded from the environment. A large number of factors influence how easily people find their way. They can be loosely grouped into three different types – people factors, environmental factors and information factors. All these factors can affect people's ability to find their way to their destination, and equally importantly, to know they have arrived.

In the recent literature (uncountable noun and cannot be made plural) on wayfinding, there is very limited researches on creating a relationship between the wayfinding challenges and their

* **Corresponding Author:** Zareen Jahan Khan, Lecturer, Department of Architecture, Southeast University, 251/A & 252, Dhaka 1208, Bangladesh; Email: *zareenjk.seu@gmail.com*

effect on the experience of the visitors. So, addressing this issue, the present research focuses on identifying the problems faced by the visitors while finding their destination within a hospital complex and how different factors related to signage affect an individual's wayfinding experience.

Objectives:

1. To observe the existing layout and wayfinding condition from entry to the selected destination block

2. To identify the factors while finding their way to the destination and the issues the visitors face related to these factors through a questionnaire survey

3. To establish a relationship between the individual factors and overall wayfinding experience of the visitors by data analysis.

II. Literature Review

Current literature on wayfinding:

The term wayfinding is described as a process in which people go through to find their way in an environment. In the literature named "Wayfinding: design for understanding" it is mentioned that "*the basic ability for people to get from point A to point B—a process called wayfinding—with minimal anxiety and aggravation provides patients, visitors, and, ultimately, the healthcare facility with some significant benefits*." Extensive research has been done on 'Place Legibility' and Wayfinding which discusses results of how people find their ways based on collecting data, individuals' perceptions of distances, angles, and locations etc. Among different works of literature, Kevin Lynch's The Image of the City (1960) is regarded as the foundation for human wayfinding research.

In this research, the case study is based on people's visual access to information throughout the circulation route. It focuses on signage for identification and directional information, clear visual access and the spatial layout of the complex and its influence on the wayfinding experience of the visitors. The three variables signage, spatial layout and visual access are actually among the four environmental variables of built environment stated by Weisman. In the case study area, the entry points are selected where maximum people arrive and the destination blocks are selected according to the use of the patients.

Wayfinding in healthcare: why needed?

In a hospital, a visitor whether he or she is a patient, family member, or healthcare provider come to the medical facility with the hope of getting desired services. In this situation finding their way to the destination and getting lost seems hectic to them which creates a negative impact on their mind.

Good wayfinding promotes (Passini and Arthur1992) reduction of stress, functional-efficiency, visitor-accessibility, safety, patient-empowerment etc. One study at a major tertiary hospital estimated the cost of wayfinding problems at $220,000 per year (Zimring 1990). Another indirect cost of poor wayfinding is that lost visitors are late or miss their appointments as people who visit the hospital infrequently misjudge how long it takes to navigate the unfamiliar environment (Zimring 1990). Ensuring patients and visitors feel comfortable with basic navigation from the minute they approach and enter the facility not only reduces stress and frustration, but also communicates to everyone who enters the structure.

Factors that affect wayfinding:

A large number of factors influence how easily people find their way. In the book "Effective wayfinding and signing system: guidance for healthcare facilities" by Colette Miller and David Lewis, it is stated that the factors can be loosely grouped into three different types – people factors, environmental factors and information factors. All these factors can affect people's ability to find their way to the destination, and to know they have arrived. Among the three variables that have been considered for this research, signage is the information factor whereas spatial layout and visibility both are environmental factors. In this research, people factor has not been considered.

Signage as a part of information factor:

People receive, see, and look for a range of information to help them find their way. The clarity, accuracy, legibility, positioning,

prominence and understandability of this information will vary between sites, and often between different departments at the same site. Signs, directories, site-maps located at the site, environmental information and spoken directions all are parts of information factors.

Signage helps to direct, inform, identify and define appropriate behaviour in case of wayfinding. In a medical setting, signs provide four types of information: Informational (i.e., where to find assistance, hours of operation, etc.), Directional (i.e., for the radiology department, turn left), Identifying (i.e., identifies an area, such as the oncology department) and Regulatory (i.e., radiation in use).All types should be incorporated into the design in a logical, consistent, and user-friendly way.

In case of signage, number of signs, font size, colour contrast, easy understandability of the instructions all are very important factors. In the literature "Design that Cares: Planning Health Facilities for Patients and Visitors" by Carpman, Grant and Simmons the necessity of these factors in case of signage have been mentioned. In case of number of signs and sign placement it is stated that a hierarchical system of major and minor signs need to be developed. The signs should be easily readable preferably within six grade reading level so that it can serve the audience of all gender, age and education. The font size should be large enough both for pedestrian and the driver driving at 30-35 miles per hour speed. According to the standard, the font size in signs should not be less than 4-5 inches.

Contrast between the foreground and background is one of the most important factors for the ease of reading for signage. If coloured text is used on a bright background the contrast will be weak, for optimal contrast results is white text against dark-coloured backgrounds. Eight colours are suitable for colour coding systems. Black, white and grey can also be used. Some most visible combinations are: black on yellow, black on white, yellow on black, white on blue etc.

III. Methodology

To conduct the research, at first a case study area is selected among the widely used hospitals of Dhaka where the wayfinding issue need to be addressed properly. After that the existing condition of the hospital complex and the challenges that are faced by the visitors while finding their way are identified through observation. Then to identify the factors that influence the wayfinding experience and satisfaction of the visitors, a questionnaire survey is done on the selected participants. Finally by data analysis a relationship is established between these factors and the visitors' satisfaction rate with the wayfinding experience.

Selection of case study area:

Among several hospitals, the BSMMU (Bangabandhu Sheikh Mujib Medical University) hospital, popularly known as PG hospital has been selected for this research as a case study for being ~~the~~ one of the most prestigious and widely used hospitals in Dhaka city. Among the five entrances of the hospital, the gate 2 and gate 3 are selected as the starting point of the wayfinding task because both the gates are adjacent to the Shahbagh node where most of the public transport arrive and the majority of the visitors enter from these gates within the hospital complex. Among the five building blocks, Block C and outpatient department are selected as the destination points. Block C is the main hospital building located within the main hospital complex whereas the outpatient department (OPD) is located at a separated complex quite far away from the entrances near Shahbagh.

Data collection:

Existing spatial layout:

In the spatial layout of the hospital complex in figure 1, it is shown that there are total five entrances, gate 1 is at the south adjacent to the Shahbagh node, gate 2,3,4 are at the east side just beside the Kazi Nazrul Islam Avenue and gate 5 is at the west side. The main axis of the complex goes from east to west connecting the gate 3 and gate 5. The block C building is just beside this main axis. Another secondary axis, parallel to the main one, connects the outpatient department 2 of block E at the west side with the gate 1 and gate 2 located at the opposite side. Gate 5 is beside the Nabab Salimullah Road at west side connected with the elephant road at the south.

Existing wayfinding condition:

Graphical information: It is observed that most of the people come to the hospital complex by bus (38%) or rickshaw (26%). After the entrance, the you-are-here map is present at all the entry gates that helps the visitors to find their locations with respect to the whole layout. The name of the building blocks is written in a large font at the entry point of ~~the~~ each building for clear visibility. There are some signages and landmarks at certain intervals to guide the visitors to the buildings and the parking areas within the complex but they are very few in number. The location and some images of the existing signage are shown in figure 1.

Verbal information: At all the entrances there is an information booth to provide information to the visitors. There are also some security guards at the entrance of each building and near the parking who can also help the visitors to find their destination.

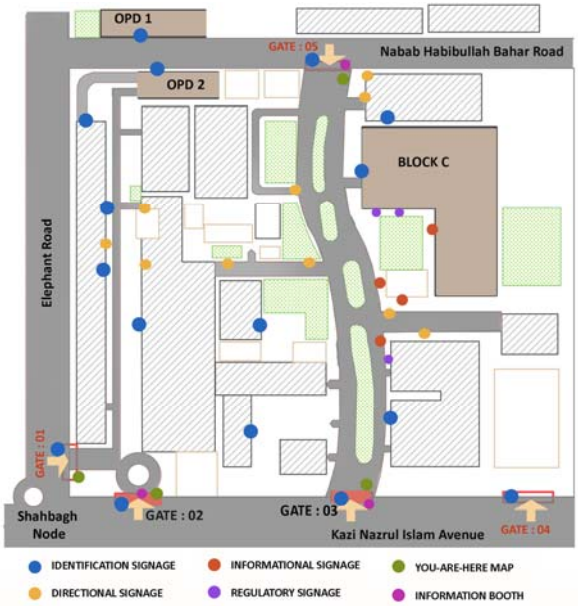


Figure 1: Existing signage locations in BSMMU hospital

Within the hospital complex, the gate number, a you-are-here map and an information booth is present in all the entry gates. There are some identification, directional and information signs throughout the whole complex (shown in figure 1).

After the observation on existing spatial layout and wayfinding condition, four routes are fixed within the hospital to conduct the survey (shown in figure 2).

Questionnaire Survey:

For a questionnaire survey, 40 university students have been selected who have not visited the BSMMU hospital within one year (February 2018 to February 2019). They are all students of 2nd and 3rd years of the department of architecture aged between 18 to 22. In the first part of the questionnaire, the demographic information (age, gender, mode of transport, last visit) are collected (Table 1). After that, the feedbacks of the visitors are taken related to different factors of signage, visibility and spatial layout. Finally, the visitors give their opinion about the overall satisfaction related to various factors of signage.

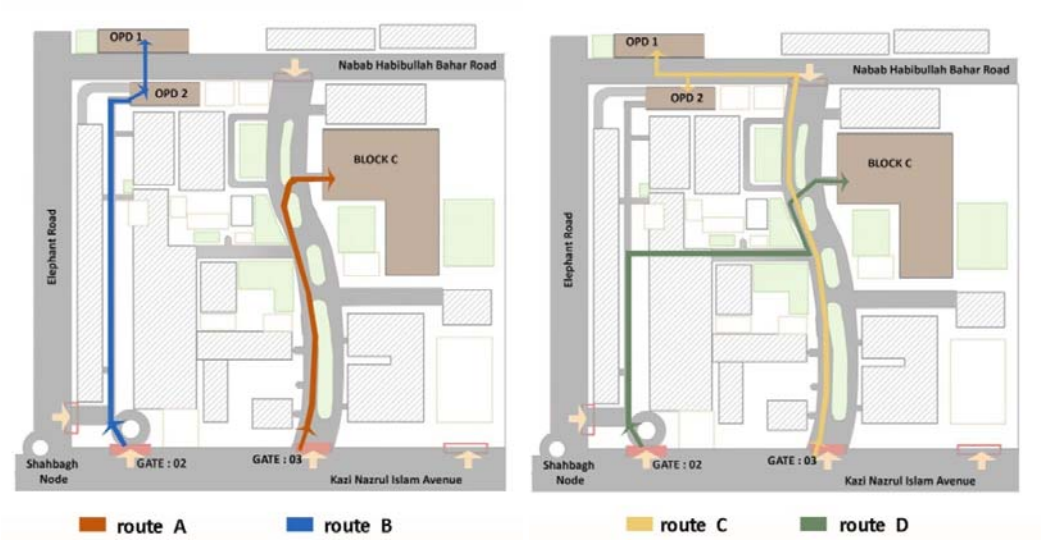


Figure 2 : Selected four routes for survey in BSMMU hospital complex

Table 1: route description & number of participants in each route

	route A	route B	route C	route D
starting-destination	gate 3-block C	gate 2-OPD	gate 3-OPD	gate 2-block C
total participants	10	10	10	10
age (yrs)	18-22	18-22	18-22	18-22
male	4	5	6	7
female	6	5	4	3

IV. Data Analysis

The main objective of this analysis is to identify a relationship between the overall satisfaction related to signage with the individual wayfinding factor for all the selected four routes. From the literature, it is evident that~~,~~ signage, is among the major environmental variables and considered as an environmental factor which has a significant impact on the wayfinding experience of an individual within a built environment. The data was collected through observation and questionnaire survey from the 40 visitors (10 visitors in each route) within the hospital complex. The statistical analysis is conducted where the overall satisfaction is the dependent variable and the individual factors are the independent variables (Table 2). The analysis tries to reveal that whatever the route is within the hospital complex some factors have a strong effect on ~~the~~ patient satisfaction which eventually affects their wayfinding experience.

Table 2: dependent & independent variables for the survey

DEPENDENT VARIABLE	INDEPENDENT VARIABLE
Overall satisfaction related to signage	Number of signage
	Font size
	Color contrast
	Understanding the instructions
	Locating destination in YAH map

From the perspective of wayfinding, the first factor that helps the visitors within a built environment is signage. Wayfinding signs provide simple solutions to prevent ~~the~~ visitors from getting lost while finding their destination. Getting lost creates anxiety and frustration among the visitors which have a negative impact on their overall wayfinding experience. Better signage system with proper font size, colour contrast, instruction can help to generate a good wayfinding condition within a built environment. From the literature, mainly four types of signage are found, they are: identification, directional, informational and regulatory. You-are-here map will also be considered as signage.

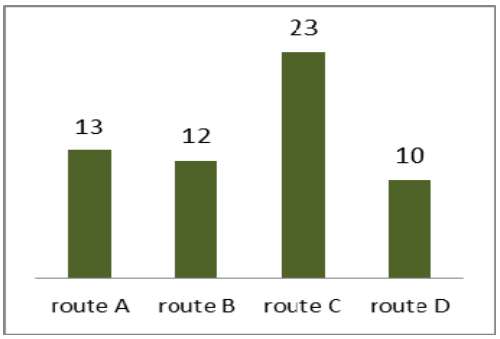


Figure 3: Total Number of signage in different routes

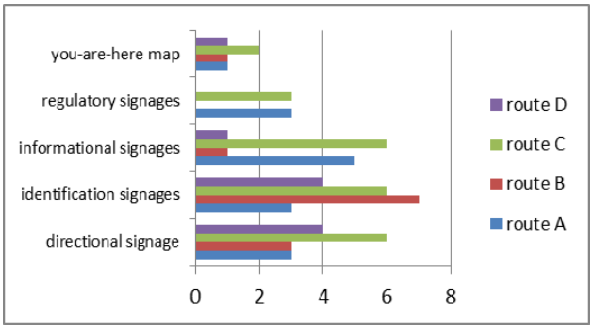


Figure 4: Number of different signage in different routes

From the Figure 4, it is observed that except the regulatory signage, the other three type of signage are present in all the four routes. Identification sign which is the most vital among all the types is the highest in route B, whereas informational signage is the highest in route A and route C. You-are-here Map is present at all the entry gates. From the summary of total number of signage, route C contains the highest number that is 23 and route D the lowest that is 10.

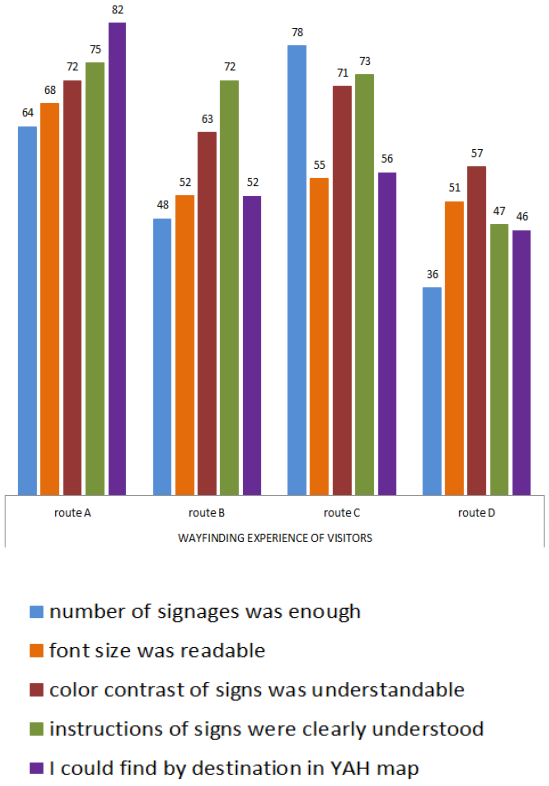


Figure 5: visitors experience regarding number of signage, font size, colour contrast, instructions and finding destination in YAH map

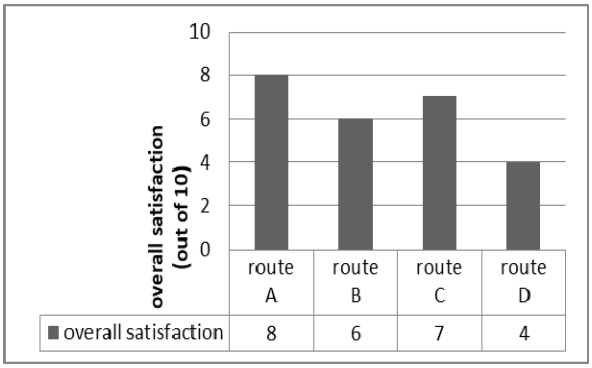


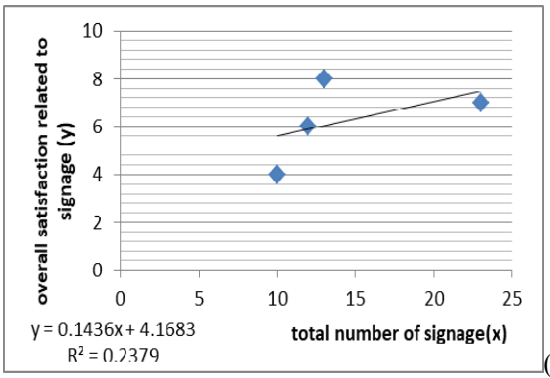
Figure 6 : Overall satisfaction due to signage

In Figure 5, the percentage of visitor satisfaction is shown in case of all the five factors (number of signage, font size, color contrast, instruction, understanding location in you are here map) for the four routes from the questionnaire survey. In case of font size, colour contrast and YAH map, route A has the maximum satisfaction, whereas

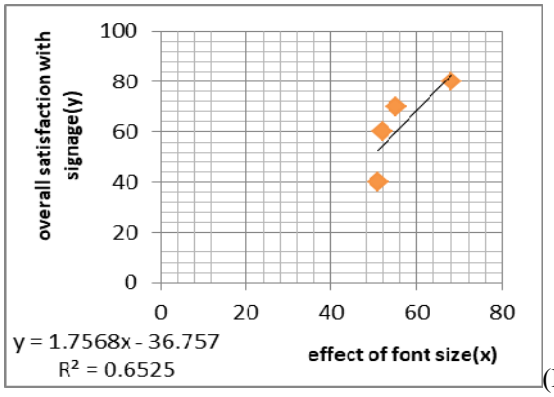
number of signage is the highest in route C. Apart from route D, all the other three routes shows good satisfaction rate in understanding instructions.

In figure 6, the overall satisfaction is shown combining all the factors having 10 visitors in each route. In route A, 8 out of 10 visitors are satisfied with signage whereas the rate is lowest in route D with 4 visitors.

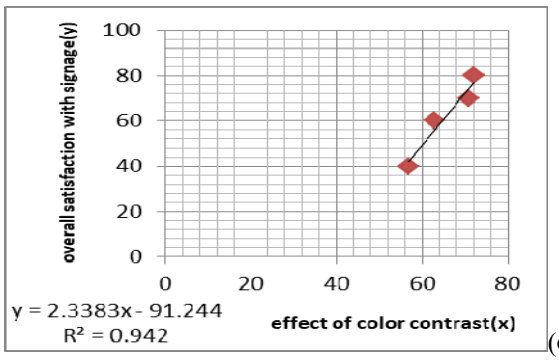
A statistical analysis between overall satisfaction related to signage and all these five factors is done to understand whether these factors have significant effect on visitors' satisfaction or not.



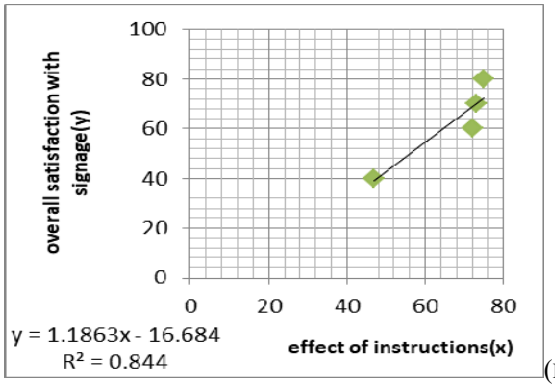
(A)



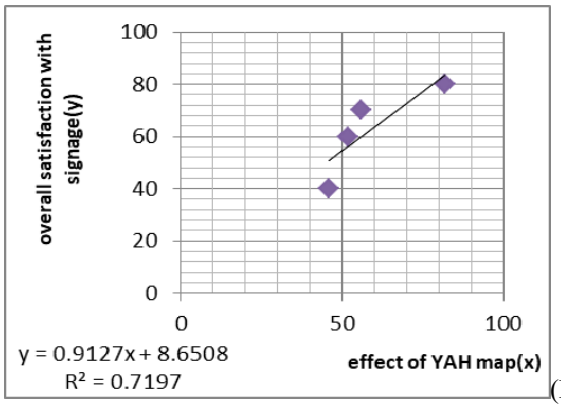
(B)



(C)



(D)



(E)

Figure 7: analysis between overall satisfaction due to signage (%) and (A)number of signage (B) effect of font size (C) effect of color contrast (D) effect of understanding instructions (E) effect of finding destination in YAH map

In Fig. 7, (A) a regression analysis is done between overall satisfaction related to signage and total number of signage. In regression when the R^2 is 0.5 to 1 that means the relationship is statistically significant. But here R^2 is 0.2379 which is lower than 0.5.that is the relationship is not statistically significant.

In case of figure 7, (B,C,D,E) it is observed that after the statistical analysis the R^2 value is above 0.5 in cases of all the other four factors that

means each of them is statistically significant. Also, the coefficient of x is positive in all the four cases that means the factors have positive correlation with the overall satisfaction of the visitors. Among the four, the highest R^2 value is in case of colour contrast of signage that is 0.942, which means that it has the most effective impact on patients' satisfaction regarding signage. On the contrary, the lowest R^2 value is 0.65 which means that it has less impact on patient-satisfaction of signage, but as the value being more than 0.5, it is still significant statistically. After the statistical analysis, all the findings can be summarized to find out which factor has the most effective impact on patient satisfaction (Table 3).

Table 3: R^2 value and x coefficient of the independent variables

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	R^2 VALUE	X COEFFICIENT
Overall satisfaction related to signage	Number of signage	0.24	NA
	Font size	0.65	+ (positive)
	Color contrast	**0.94**	**+ (positive)**
	Understanding the instructions	0.84	+ (positive)
	Locating destination in YAH map	0.72	+ (positive)

V. Discussion:

The study concentrates on the effect of signage on the visitors' wayfinding experience, whether these factors have any significant effect on their satisfaction or not. The number of different types of signage (identification, directional, informational, regulatory and you-are-here map) are shown in figure 4 for all the four routes. After the statistical analysis in fig 7, it is observed that the relationship between overall satisfaction regarding signage and the total number of signs is not statistically significant as the R^2 value is 0.24(<0.5). In the literature "Design that Cares: Planning Health Facilities for Patients and Visitors" by Carpman, Grant and Simmons along with the number of signs, the importance of sign placement is also mentioned that a hierarchical system of major and minor signs need to be developed. So both from statistical analysis and literature it is evident that only the total number of signs is not enough for wayfinding, there is a need of their correct placement throughout the site. In Fig 7, an analysis between overall satisfaction (%) and number of signage, effect of colour contrast, effect of font size, effect of understanding instructions and effect of finding destination in YAH map are shown. Among the five graphs, it is observed that colour contrast have the most significant impact on overall satisfaction regarding signage having a R^2 value of 0.94 (>0.5). In the literature, it is stated that contrast between the foreground and background is one of the most important factors for the ease of reading for signage. It is also mentioned that the instruction should be clear and readable for all type of audience preferably within six grade reading level. Also, the effect of instructions is significant on visitors (R^2=0.84). Thus, for these two factors; colour contrast and understanding the instruction, the statistical analysis support the literature. In case of font size and effect of YAH map, the impacts are statistically significant (R^2=0.65 and R^2=0.72 respectively), but they are less than the other two factors.

VI. Conclusion:

It is needed to be mentioned that there are other informational and environmental factors which also affect the wayfinding behaviour of people. Another important factor is people factor which represents the cognitive ability of the people which helps to find their desired location. However, in this study, the focus is on signage. The other factors have been avoided in this study. Further research can be done by considering the effect people factor and other environmental and informational factors on wayfinding experience of visitors.

The good wayfinding experience and better accessibility to the hospital will reduce the

anxiety as well as will create a positive perception among the patients about the quality of care of that hospital. In a summary, the findings of this research will help the professionals for providing better wayfinding experience to the visitors within a hospital complex.

References

C. A. Lawton, Gender Differences in Wayfinding Strategies: relationship to spatial ability and spatial anxiety. *Sex Roles, 30,* 765-780. (1994).

C. A. Lawton, Strategies for Indoor Wayfinding: The role of orientation. *Journal of Environmental Psychology, 16,* 137-145. 107 (1996).

C. Zimring, The Cost of Confusion: Non-monetary and monetary cost of the Emory University hospital wayfinding system. Atlanta: Georgia Institute of Technology (1990).

J.R. Carpman; M.A. Grant; D.A. Simmons, Design that Cares: Planning Health Facilities for Patients and Visitors; American Hospital Publishing: Chicago, IL, USA, (1986).

J.R. Carpman; M.A. Grant; D.A. Simmons, Hospital design and wayfinding: A video simulation study. Environ. Behav. (1985)

M. Raubal, M. J. Egenhofer, Comparing the complexity of wayfinding tasks in built environments* (1998)

P. Arthur and R. Passini ,*Wayfinding: People, Signs, and Architecture,* Toronto: McGraw-Hill Ryerson (1992)