INTERNSHIP TRAINING

AT

ARTEMIS HOSPITALS, GURUGRAM

(4 FEB- 4 MAY 2019)

EVALUATION OF USER SATISFACTION AMONG HOSPITAL MOBILE APP USERS IN ARTEMIS HOSPITAL USING SYSTEM USABILITY SCALE

BY

MAHAK RANA

PG/17/31

UNDER THE GUIDANCE OF

DR. NISHIKANT BELE

POST GRADUATE DIPLOMA IN HOSPITAL AND HEALTH MANANGEMENT

2017-19

International Institute of Health Management Research
New Delhi

2019

The certificate is awarded to

Mahak Rana

In recognition of having successfully completed her

Internship in the department of

Medical Informatics

And has successfully completed her Project on

Evaluation of user satisfaction among hospital mobile app users in Artemis hospital using system usability scale

From 4 Feb- 4 May 2019

Artemis Hospitals, Gurugram

She comes across as a committed, sincere and diligent person who has a strong drive and zeal for learning.

I wish her all the best for future endeavours.

Rashmi Sinha

Divisional Head

Medical Informatics

Artemis Hospitals

Gurugram

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mahak Rana**, student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone internship training at Center for Human Progress, Delhi from 4 Feb 2019 to 4 May 2019.

The student has successfully carried out the study "**Evaluation of user satisfaction among hospital mobile app users in Artemis hospital using system usability scale**" which was assigned to her during internship training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

We wish her all success in all her future endeavors.

Dr Pradeep K Panda Mentor
Dean, Academics and Student Affairs
IIHMR, New Delhi

Mentor
Dr. Nishikant Bele
Assistant Professor
IIHMR, New Delhi

CERTIFICATION FROM DISSERTATION ADVISORY COMMITTEE

This is to certify that Ms. **Mahak Rana**, a graduate student of the Post Graduate Diploma in Health and Hospital Management has worked under our guidance and supervision. She is submitting this dissertation titled **"Evaluation of user satisfaction among hospital mobile app users in Artemis hospital using system usability scale"** at IIHMR, New Delhi in partial fulfillment for the award of the Post Graduate Diploma in Health and Hospital Management.

This dissertation has the requisite standard and to the best of our knowledge no part of it has been produced from any other dissertation, monograph, report or book.

Dr. Nishikant Bele

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Assistant Professor

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Rashmi Sinha

External Mentor

Divisional Head

Artemis Hospitals, Gurugram

CERTIFICATE OF APPROVAL

The following dissertation titled "**Evaluation of user satisfaction among hospital mobile app users in Artemis hospital using system usability scale**" at "Artemis hospitals, Gurugram" is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a pre-requisite for the award of Post Graduate Diploma in Health and Hospital Management for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name Dr Madhulekha Bhattacharya Signature MBhattacharya 31/5/19

Dr. Anandhi Ramachandran 31/5/2019.

TO WHOMSOEVER IT MAY CONCERN

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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled "**Evaluation of user satisfaction among hospital mobile app users in Artemis hospitals using system usability scale**" in Artemis Hospitals Gurugram and submitted by **Mahak Rana**, Enrolment No. PG/17/031 under the supervision of **Dr.NishikantBele**, for the award of Post Graduate Diploma in Hospital and Health Management of the Institute carried out during the period from 4 February 2019 to 4 May 2019 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Mahak Rana

PG/17/031

FEEDBACK FORM

Name of the Student: Mahak Rana

Dissertation Organization: Artemis Hospital

Area of Dissertation: Evaluation of user satisfaction among hospital mobile app users in Artemis hospital using system usability scale

Attendance: 100%

Objectives Achieved: Yes

Deliverables: All met

Strengths: Confident and Quick learner

Suggestions for Improvement: Nil

Suggestions for Institute: Nil

Rinka

Signature of the Organization Mentor (Dissertation) Ms. Rashmi Sinha

Date: 13/6/2019

Place: Artemis Hospital, Gurugram

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Mahak Rana

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ABBREVIATIONS

SUS	SYSTEM USABILITY SCALE
HCP	HEALTHCARE PROFESSIONAL
JCI	JOINT COMMISSION INTERNATIONAL
EMR	ELECTRONIC MEDICAL RECORD
SLA	SERVICE LEVEL AGREEMENT
SPSS	STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES
TAT	TURN AROUND TIME

SECTION 1: OVERVIEW

INTERNSHIP REPORT

SECTION 1: OVERVIEW

INTERNSHIP REPORT

(04 Feb - 04May 2019)

Organization Profile

Artemis Health Institute, established in 2007, is a healthcare venture launched by the promoters of the Apollo Tyres Group. Artemis is the first Hospital in Gurugram to be accredited by Joint Commission International (JCI) (in 2013). It is the first hospital in Haryana to get NABH accreditation within 3 years of start up.

INTRODUCTION

Artemis Hospital, established in 2007, spread across 9 acres, is a 400 plus bed; state-of-the-art multi-speciality hospital located in Gurugram, India. Artemis Hospital is the first JCI and NABH accredited hospital in Gurugram.

Designed as one of the most advanced in India, Artemis provides a depth of expertise in the spectrum of advanced medical & surgical interventions, comprehensive mix of inpatient and outpatient services. Artemis has put modern technology in the hands of renowned from across the country and abroad to set new standards in healthcare. The medical practices and procedures followed in the hospital are research oriented and benchmarked against the best in the world. Top-notch services, in a warm, open centric environment, clubbed with affordability, have made us one of the most revered hospitals in the country.

Vision, Mission & Core Values

Vision Statement

To create an Integrated World Class Healthcare System, Fostering, Protecting, Sustaining and Restoring Health through Best in Class Medical Practices and Cutting Edge Technology developed through in depth Research carried out by the World's Best Scientific Minds.

Core Values

The corporate value system at Artemis is founded on three pillars – Service, Compassion and Integrity.

- Care for customer

- Respect for Associates
- Excellence through Teamwork
- Always Learning
- Trust Mutually
- Ethical Practices

Mission

- Deliver world class patient care services
- Excel in the delivery of specialized medical care supported by comprehensive research and education
- Be the preferred choice for the world ' s leading medical professionals and scientific minds
- Develop, apply, evaluate and share new technology
- Be an active partner in local community initiatives and contribute to its well-being and development.

ACCREDIATIONS: Artemis Hospital is the first JCI and NABH accredited hospital in Gurugram.

Awards and Recognition

Artemis is Recipient of awards like:

- **Most Promising Start-Up of the Year 2007 award** – Express Healthcare magazine
- **Best IT Implementation for the Year 2008** – PC Quest magazine for Hospital Information System
- **Best institute for Medical Value Year 2010** – The CNBC Awaaz travel awards
- **Asia Pacific Hand hygiene excellence Award Year 2011** – World Health Organisation (WHO)

Artemis Hospital Services:

Artemis hospital has incorporated a vast number of medical care centers which provides the most exceptional care:

Emergency and trauma center

Heart center

Neurosciences Center

Cancer center

Joint replacement and orthopedicscenter

Minimally invasive and bariatric surgery center

Transplant center (kidney, cornea, liver and bone marrow transplant)

Woman and child center

Critical care and pulmonology center

Gastrosciencescenter

Cosmetology and plastic surgery center

Angiogram

PCI (Percutaneous Coronary Interventions)

Pacemaker Implantation

Chest Pain Treatment

Acute Aortic Dissection

Patent Foramen Ovale

Patent Ductus Arteriosus (PDA)

Aortic Anuerysm Surgery / Endovascular Repair

Intra - Arterial Thrombolysis

Rheumatic Heart Disease Treatment

Treatment of arrhythmia

Hypertension Treatment

Valvuloplasty

TAVI (Transcatheter Aortic Valve Implantation)

ASD / VSD Device Closure

Coronary Angiogram

Heart Conditions

Coronary Angioplasty / Bypass Surgery

Ultrasound

Blood Test

ECG

X-Ray

Pharmacy

Laboratory

Operation Theater

Treatment for Leukemia, Lymphoma and Myeloma

Bone marrow transplantation

Bionworks Technologies

Bionworks Technologies is a b2b healthcare technology startup that offers Clinical mobility and patient engagement solutions. It was founded in early 2016 by a team of visionaries and technologists with over three decades of experience in designing and building hospital information systems. Bionworks provides two solutions over its cloud platform - 'Healthplug' .Healthplug Patient - A cloud based patient engagement platform with white labelled apps that can integrate into a hospitals existing HIS solution. Healthplug MD - A collaborative, mobile EMR that integrates with the hospital's existing HIS infrastructure to enable secure anywhere, anytime access to medical records and helps clinical teams collaborate over a patient centric model.

HEALTHPLUG MD - The essential catalyst for clinical productivity

A mobile first EMR, a multi-disciplinary task manager and a secure team messaging app rolled into one, Healthplug MD is one of the most comprehensive productivity tools available for care providers in the industry today.

Healthplug MD seamlessly integrates with your existing EHR and brings dexterity and efficiency to your enterprise while helping you stay compliant with quality standards and regulations.

Mobile EMR

Secure and authorized access to patient medical record on the move

Team messaging

Patient centric team messaging with contextually dynamic user teams

Order entry

Access controlled, workflow enabled, physician order entry on the go

Clinical documentation

Configurable clinical smart forms with scoring and outcome driven workflows

Multi-disciplinary workflows

Configurable clinical workflows with SLA based notifications and escalations

Referrals

Cross departmental referrals with documentation, notifications and reminders

Incident management

Workflow driven incident recording, escalation, tracking and reporting

Discharge process

Workflow based discharge planning tools to improve discharge TAT.

HEALTHPLUG PX - Customizable mobile platform to deliver connected patient experiences

Healthplug PX is a highly customizable, white labelled, multi-lingual patient engagement mobile app that enables providers deliver a connected experience before, during and after the patient's visit to the hospital.

Healthplug PX helps you extend your reach beyond the boundaries of your hospital, engage your patients and deliver great healthcare experiences.

Pre-admission

External medical report aggregation and patient-provider chat

Onlineappointments

Doctor availability and appointments management with optional payment gateway integration

Personal health records

Enable patients to access their medical records on their smart phones

Post discharge care

Patient self-managed care plans initiated and monitored by the provider

Telemedicine

Integrated virtual patient consultations using video, audio and text chatting

Immunization records

Paediatric immunization tracker with follow up reminders

Patient self services

Self Registration and Online payments for convenience and efficiency

Hospital showcase

Hospital, doctor and service profiles with push marketing.

SECTION 2: DISSERTATION

Evaluation of user satisfaction among hospital mobile app users in Artemis hospital using system usability scale

CHAPTER 1: INTRODUCTION

Background

In the past few decades there has been advancing growth in information and technology and its application in various fields. The employment of mobile web devices and applications (apps) has revolutionized health care, communications, commerce, education, and recreation, and all the other aspects of human life. The utilization of mobile devices and apps has also remodelled several other aspects of clinical healthcare. The use of mobile web devices, smart phones, and apps can enhance communication among healthcare professionals (HCPs) and patients. HCPs can use medical devices and apps for several functions, most of which might be sorted underneath 5 broad categories:

In spite of these benefits some HCPs are reluctant to adopt these mobile medical apps. The key reason being lack of installation of higher standards and validation practices. Integration of these progressively complex and innovatory tools in clinical healthcare is done through installation of these standards that successively can raise the barrier for entry into the medical app market. The standard and safety of the apps in the market for the HCPs use will be considerably increased and therefore the probability of being adopted by more HCPs is increased further.

The most noteworthy advantage offered by mobile devices and apps is that they permit access to point-of-care tools that boost effective clinical decision making on the part of HCPs and produce better patient outcomes. Ideally, HCPs need access to plenty of data and communication resources in an exceedingly clinical setting including:

- Communication capabilities – voice calling, video conferencing, text and e-mail
- Hospital information systems (HISs) – electronic health records (EHRs), electronic medical records (EMRs), clinical decision support systems (CDSSs), picture archiving and communication systems (PACSs) and laboratory information systems (LISs)
- Informational resources – textbooks, guidelines, medical literature, drug references
- Clinical software applications – disease diagnosis aids, medical calculators.

There is a need for mobility in healthcare settings and all the above resources were previously provided by stationary computers and devices which did not support this requirement of portability. Workstations on Wheels (WOWs) or Computers on Wheels (COWs) were some attempts by healthcare environments to address the issue. Although availability of mobile

devices such as smart phones and tablets have now made all the information and resources instantly accessible at the fingertips of clinicians.

A 2012 study dealing with the reasons behind the utilization of mobile devices by HCPs called the Manhattan Research/Physician Channel Adoption Study showed some interesting results. The results clearly showed that the most prominent activity was searching and 98% HCPs used their personal computers/laptops to search, 63% used their tablets and 56% used their smartphones for it. Specifically in the case of doctors, searching dominated as the most frequent use of smartphone utilizing 48% of phone time and professional apps taking an additional of 38%. Similar results were obtained in case of physicians as well, who spent an average of three hours per week watching internet videos for professional purposes on personal computers/laptops (67%), tablets (29%), and smartphones (13%); the most regularly viewed content (55%) was continuing medical education (CME) activities. 85 % of medical school students and HCPswere also seen using mobile devices mostly for communication, time management or information relating to education and patient care and other clinical purposes.

Medical apps and mobile devices have shown beyond doubt that they are indispensable tools for HCPs to this point, and as their uses and features expand, they're expected to be incorporated more extensively in healthcare domain to encompass the majority aspects of clinical practice.

However, there is an exigency for rigorous analysis, validation, and in turn the development of best-practice standards for medical apps. An elementary level quality and safety of these tools ought to be ensured. This may establish to be the most determinant factor of an app's worth to provide meaningful, timely and accurate data, information and guidance to the end user so as to serve the crucial purpose of improving patient outcomes.

CHAPTER 2: OBJECTIVES

1. To evaluate the level of satisfaction amongst mobile app users in Artemis Hospital, Gurugram
2. To assess the possible barriers and facilitators for successful adoption of mobile app in Artemis Hospital.
3. To examine hospital staff and patients perception of mobile app.

CHAPTER 3
LITERATURE REVIEW

A literature review provides us with the present knowledge together with substantive findings, in addition to theoretical and methodological contributions towards a particular topic. It is the first step for any research work. Literature review brings us at par with the current status of our research as well as provides us with the problems left unsolved laying the ground work for new research.

A study in the year 2016 examined physicians' perception on the use of tablets with EMRs in an inpatient setting. They constructed a survey questionnaire of total 57 items that aimed to examine users' perceptions of and attitudes toward tablets with mobile EMRs during the workday. The conclusions were favourable in the use of tablets in an inpatient setting and it was also concluded that physicians view tablets with EMR as clinically useful. (**Julian Duhm**, **et al.**)

A study conducted by **C. Lee Ventola**in the year 2014assessed the uses and benefits of mobile devices and apps for health care professionals. He concluded that meticulous evaluation, validation, and the best-practice needs development which requires the raise in the standards of medical apps and it needs a check on the quality and safety of the tools being used in the practice. The execution of such measures would decide the main determinant of an app's value and it may ultimately be its ability to provide meaningful, accurate, and timely information and guidance to the end user which would help to serve the vital purpose of improving patient outcomes.

A study by **MosaAS**et al. conducted a systematic review of the healthcare apps available for smart phones wherein he found out that many medical apps for smart phones are in use, professionals and patients are getting used to it and this has shown a great improvement in the health sector. The extensive use of smart phones in healthcare sector is capturing more and more attention every day. The apps used in medical care make smart phones informative tools which help in the practice of evidence-based medicine at the point-of-care, apart from their use in mobile clinical communication. Also, smart phones play a vital role in patient education, self-management of disease, and remote monitoring of patients.

CHAPTER- 4
METHODOLOGY

Study design: Cross-sectional study

Study Type- Quantitative

Sampling Methodology- Convenient sampling

Location of Study: Artemis Hospital, Gurugram,

Study Population: Users of Mobile App in Artemis Hospital, Gurugram

Sample size: A sample size of 100 is targeted

Targeted group - People who use hospital mobile app

Sampling Method:

Users were divided into the following four groups:-

1. Doctors-- 10
2. Nurses--60
3. Administrative Staff--10
4. Patients--20

Type of Data: Primary data

Data Collection Tool: System Usability Scale Questionnaire

Data Analysis Tool: SPSS Software

Time frame: 4 February 2019 to 4 May 2019

Data Collection Tool: System Usability Scale Questionnaire

For the purpose of this study, a paper form of System Usability Scale questionnaire was used which was given hand to hand to the study participants. It is one of its kind tool that has not been used before for the analysis of mobile app in any Indian hospital setting. The SUS was originally designed, for the purpose of measuring the usability of a system, by John Brooke in 1986. It was developed as a part of the usability engineering programme in integrated office systems development at Digital Equipment Co. Ltd, Reading, UK. It is straightforward, ten-item high-levelled scale with five responses (from strongly disagree to strongly agree).The questionnaire does a subjective assessment of multifarious aspects of system usability. One of the key factor for the selection of SUS questionnaire is that this questionnaire is simple, adaptable and covers varied aspects extending to the usability of system is concerned so as to evaluate the satisfaction of the user.

Apart from the set of 10 questions of SUS, some demographic questions such as name, age including work experience, experience with hospital mobile app etc were also added.

Another two questions of great importance were added towards the end of the final questionnaire to measure the possible barriers and facilitators for adoption of hospital mobile app in the hospital.

As reported by its creator, while using the SUS questionnaire the following things should be taken into consideration.

Respondents must not suppose for an extended time what to check. The response given immediately is valuable.

All items ought to be checked.

If respondents are not confident of what to respond to a specific item, they must mark the centre point of the scale.

All these points were taken care of for the sake of reliability of the information.

It was planned that every selected participant will be visited thrice till he/she fills the questionnaire. For whatever reasons, if despite three visits, the participant is unable to fill the questionnaire, it will be taken into account as non-response.

This planned procedure was followed and 100 responses in total were collected.

ANALYSIS OF THE DATA

Step 1: Scoring the System Usability Scale:

The following methodology is used to calculate the SUS score according to Brooke:

>>Each item's score contribution will range from 0 to 4.

>>For positive questions/queries the score input is scale position minus 1. For negative questions/queries, the input is 5 minus in the scale position.

>>The score inputs from each item are summed.

>>The aforesaid sum is multiplied by 2.5. The result of this multiplication is the total value of SUS.

>>The SUS scores range from 0 to 100.

>>Separate scores of each item are pointless on their own.

In this manner, the SUS Score was calculated for all the 100 responses and an average score for the hospital mobile app of Artemis hospital was figured which came out to be 74.53.

Step 2: Data analysis in SPSS

The statistical package used for the analysis of the data was SPSS. The collected data was coded and an analysis run using several factors was done which will be discussed in the "Result" section. The statistical methods used were descriptive statistics which included mainly of frequency statistics and cross tabulation statistics.

Also, a manual analysis of the extra questions was done so as to figure out the possible barriers and facilitators involved for the successful adoption of hospital mobile app in the hospital.

CHAPTER-5
Results

PART I

- **SUS Score** - The data collected via SUS questionnaire suggested that the subjects rated the system as "good" usable with an SUS score of 74.53.

System measurement variables	Strongly Disagree Percentage (Frequency)	Disagree Percentage (Frequency)	Neutral Percentage(Frequency)	Agree Percentage(Frequency)	Strongly Agree Percentage(Frequency)	Total Percentage (Frequency)
Frequency of use	4.0%	4.0%	12%	20%	60%	100%
Complexity	33%	26%	9%	9%	23%	100%
Ease of use	1%	6%	7%	27%	59%	100%
Need for technical support	39%	20%	14%	9%	17%	100%
Functional integration	4%	4%	7%	38%	47%	100%
Inconsistency	24%	34%	15%	13%	14%	100%
Quick learning of the system	0%	3%	12%	22%	63%	100%
Cumbersome to use	35%	35%	16%	13%	1%	100%
Confidence in use	0%	2%	8%	24%	66%	100%
Need to learn before the use of the system	23%	25%	21%	16%	15%	100%

Table No.1

- After clubbing the above data (responses for strongly disagree and disagree; strong agree and agree were summed up) for easy and simplified output generation, the following result was obtained:

System measurement variables	**Disagree Percentage (Frequency)**	**Neutral Percentage (Frequency)**	**Agree Percentage (Frequency)**	**Total Percentage (Frequency)**
Frequency of use	8.0%	12%	80%	100%
Complexity	59%	9%	32%	100%
Ease of use	7.0%	7%	86%	100%
Need for technical support	59%	14%	26%	100%
Functional integration	8%	7%	85%	100%
Inconsistency	58%	15%	27%	100%
Quick learning of the system	3%	12%	85%	100%
Cumbersome to use	70%	16%	14%	100%
Confidence in use	2%	8%	90%	100%
Need to learn before the use of the system	48%	21%	31%	100%

Table No.2

- **SUS – System measurement variables**

1. **Frequency of use**

   The statistical assessment of the data disclosed that 80 percent of the users would rather use use the mobile app frequently and 8.0 percent of the users disagreed with wanting to use the mobile appfrequently. While, another group of 12 percent were neutral on using this statement.

   It would be appropriate to note that the users rated this aspect of the mobile appas highest among all the other variables amongst the SUS questionnaire.

2. **Complexity**

   According to the statistical evaluation of the data, 59 percent did not find the mobile appto be complex at all. While 32 percent found that using the mobile appwas complex and another group of 9 percent was neutral regarding the mobile app's complexity.

3. **Ease of use**

   A group of 86 percent of the users defined the mobile appwas easy to use providing a probable reasoning for similar high statistics for a good percentage of users to want to use the mobile appfrequently.While, only 7.0 percent of the users did not perceive the mobile app to be easy to use and 7.0 percent of the users neither found the mobile app to be easy to use nor difficult.Also, it is worth mentioning that this variable was rated as the second best feature of the mobile app by the users.

4. **Need for technical support**

   Though 59 percent of users did not believe that the support from a technician is necessary in order to be confident to use the mobile app, a large percentage of the group of users that is 14 percent had no specific opinion regarding this statement. The remaining 26 percent considered the support and guidance from the technician as important.

5. **Functional integration**

Group of respondents that are 87 percent considered the mobile appas functionally well integrated. A probable reasoning for similar high statistics for a good percentage of users to want to use the mobile appfrequently. The opposite opinion was reported by only 7 percent of the respondents; 8 percent neither agreed nor disagreed as far as for the well integration of the mobile appis concerned.

6. **Inconsistency**

Regarding the inconsistency of the mobile app, 58 percent totally disagreed. Though 27 percent agreed on the mobile appbeing inconsistent, a similar group of 15 percent neither regarded nor disregarded the mobile appas consistent.

7. **Quick learning of the system**

A majority of 85 percent users supported that the mobile appwas easy to be learnt. The proportion that supported the mobile appwas difficult to be learnt rated to 8 percent.Finally, the percentage that neither agrees nor disagrees with the statement was found to be a considerable of 7 percent.

8. **Cumbersome to use**

More than half the users that is 70 percent claimed that the mobile appwas convenient to use and not at all cumbersome. A group of 14 percent of the users agreed with the mobile appbeing cumbersome in use whereas a significant 16 percent felt neutral about this statement.

9. **Confidence in use**

A significant majority of 90 percent users felt confident in using the mobile appand only 2 percent felt doubtful while using the mobile app. The remaining group of 8 percent felt neither confident nor doubtful while using the mobile app.

10. **Need to learn before the use of the system**

Nearly half of the users, 48 percent said that there was no need of training before the use of the mobile app.A group of 21 percent who felt neutral about the need for technical support to use the mobile appalso felt neutral about their need to learn the mobile appbefore using it

while clearly 31 percent expressed their need towards being trained before the use of the mobile app.

Therefore, it is evidently found that the top three rated variables of the mobile app which satisfy the users of the mobile apt to a great extent are-

- Frequency of use
- Ease of use
- Confidence in use
- Functional Integration
- Quick learning of the system

The following variables were found to be least rated –

- Need to learn before the use of the system
- Cumbersome to use
- Need for technical support

s

		Experience with Application		
		0-1 Year	>1 year	Total
Average SUS Score	<68	26	11	37
	>68	34	29	63
Total		60	40	100

Experience with application

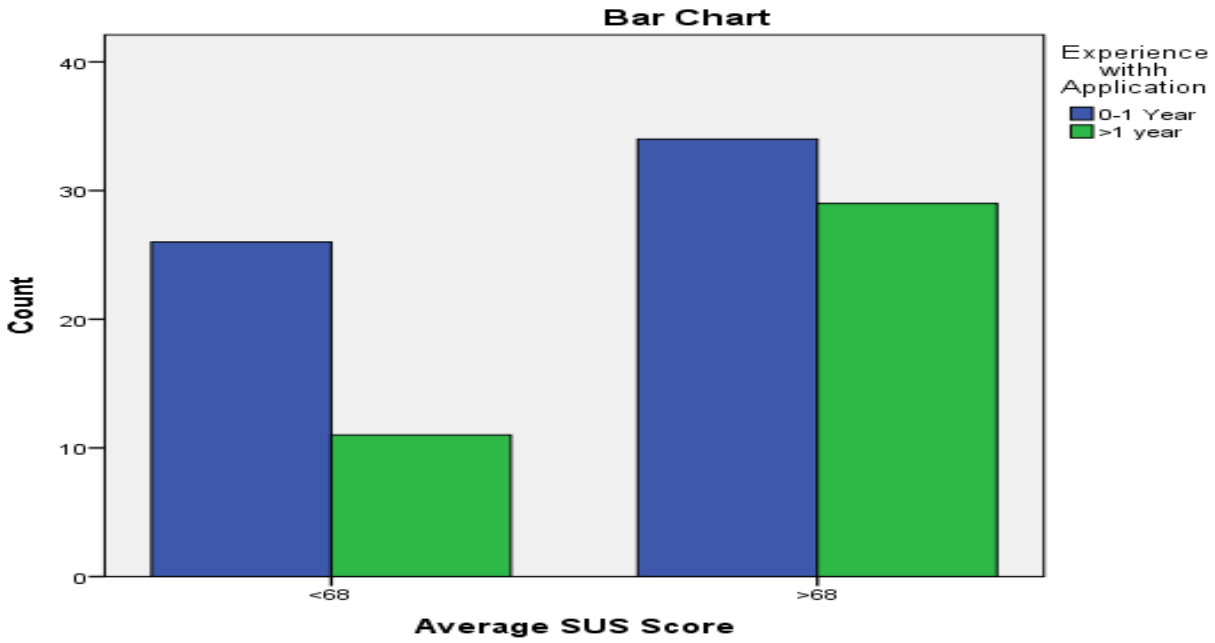


Table No.3

This graph shows 34% of users around experience of 0-1 year with mobile app has given score more than 68 and 26 percent of user with the same experience has given less than 68 score. While considering the experience greater than 1 year, 29 percent of users have given greater than 68percent. However, 11percent of users has given less than 68 score with the similar experience.

		Age Groups			
		0-25 years	26-35 years	36-45 years	Total
Average SUS Score	<68	13	19	5	37
	>68	24	32	7	63
Total		37	51	12	100

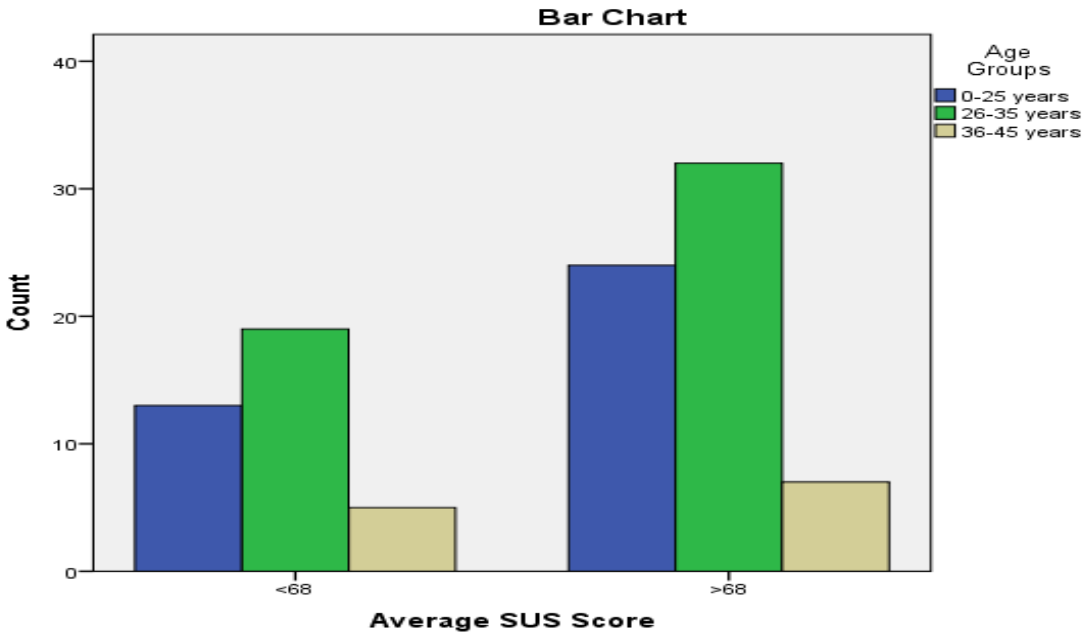


Table No. 4

This graph shows 24 percent of users around the age of 0-25 years with mobile app has given score more than 68 and 13 percent of user within the same age group has given less than 68 score. While considering the age ranging from 26-35, 32 percent of users have given greater than 68 percent. However, 19 percent of users have given less than 68 score with the similar age group. With increase in age i.e. from 36-45years, 7 percent of users have shown greater than 68 score than the 5 percent of users with less than 68 score.

These age group divisions were done to see if there is a correlation between the SUS scores and the belief that youngsters are more comfortable with technology and its application in daily use.

		Average SUS Score		
		<68	>68	Total
Response Type	Hospital Staff	31	59	90
	Patients	6	4	10
Total		37	63	100

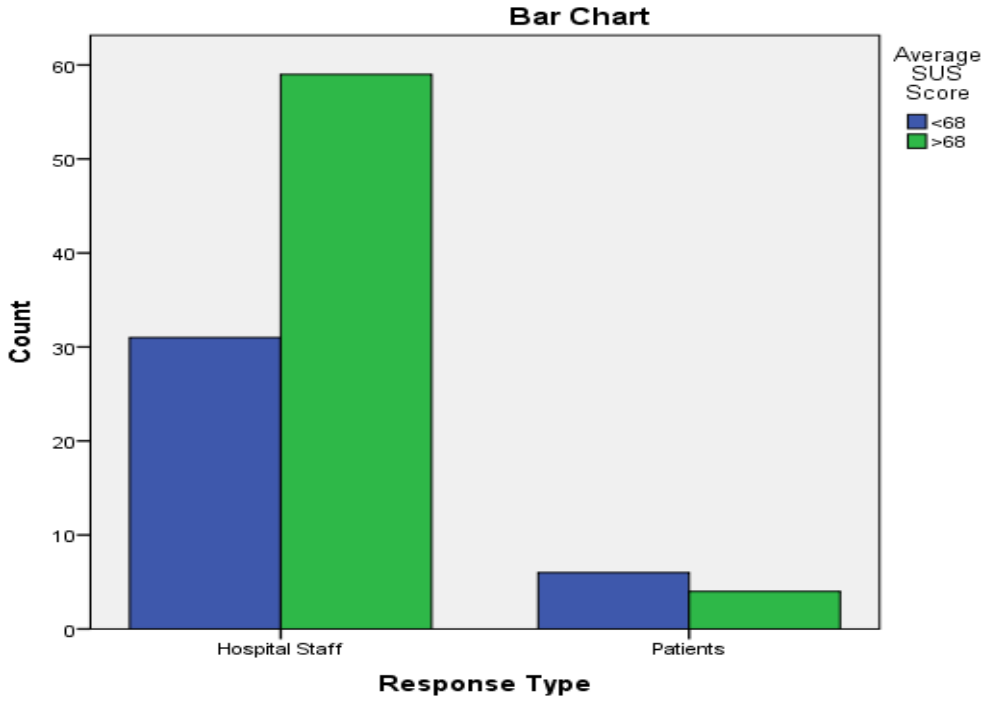


Table No. 5

This graph shows 59 percent of hospital staff using mobile app has given score more than 68 and 31 percent of user has given less than 68 score. While 6 percent of patients has given less than 68 percent and 4 percent of users has given more than 68 score.

PART II

Further analysis of the last two questions on the questionnaire revealed the following results that were tabulated according to the "Barriers" and "Facilitators" for successful adoption of mobile app in the hospital. Another sub-category made for simplifying the analysis was among "hospital staff" (viz. nurses, doctors and administrative staff) and "patients".

HOSPITAL STAFF (N=80)		**PATIENTS (N=20)**	
BARRIERS	**FACILITATORS**	**BARRIERS**	**FACILITATORS**
Technical • Slow • Hangs when typing notes • Location restriction is there	**Technical** • Very easy and comfortable system • User friendly • Quick • Less time consuming • More efficient	**Technical** • Outsourced test reports are not available • Slow	**Technical** • Easy to use • Very comfortable system • Smooth **Behavioural** • Reports are accessible at any time. • Time saving. • Appointment booking is easy • Easy to upload documents

CHAPTER-6
DISCUSSION

The purpose of this study was to better understand hospital staff and patients attitudes towardsmobile app. Results indicate extreme satisfaction with the mobile app among hospital staff and patients along with a motivation to use mobile app in the future. Users of mobile app felt that mobile app allowed for fast access to patient data. The users rated the Mobile app at Artemis hospital, Gurugram as "Good" with a SUS Score of 74.53. The top rated variables of the system which satisfy the user needs to a great extent are-Frequency of use, Ease of use, Confidence in use, Functional Integration, Quick learning of the system. The variables that are causing plight to the users of the system proving to be in need of succour are the least rated-Need to learn before the use of the system, Need for technical support, Cumbersome to use. As mentioned earlier that an SUS Score of 75 is considered to be good. Here, only a total of 59% users rated the mobile system with a SUS Score of 68 and above, while the remaining 31% users rated the system below 68. It also reported that tablet use improved hospital staff-patient interaction and streamlined clinical workflow. Time saved as a result of hospital mobile app use. Overall results from this study add on to the growing body of evidence indicating that physicians view hospital mobile app as clinically.

In my study, another important point provided was the extreme degree of satisfaction betweenhospital staff and patients with the way data were presented on the mobile app. Mobile app encouraged physicians to share medical information over the app with patients. This promotes the physician-patient interaction because one causationin patient satisfaction appears to be the amount of time patients spend with their physician.

CHAPTER-7

CONCLUSION

- The facilitators such as proper documentation, developing a paper free environment, the legibility of the prescription, ease of working on reports etc; in a manner, depict the user perception regarding the present usefulness of the mobile app or how further it can be utilized. These are the possible factors that motivate the users for working on the mobile app.
- Moving ahead, the technical factors of both the categories (hospital staff and patients), need to be rectified by the IT team at the hospital. As discussed, the users reported the system to be slow with hanging problem. These act as obstacles in the functioning of the system.. These require simplification for better efficiency of the system.
- Lastly, the barriers are the perceived factors that prevent them from using or accepting the system completely. As discussed, some users mentioned “minimal keyboard usage makes patient search time consuming”. Factors like these seem to be a result of lack of training or improper identification of the systems functions.

CHAPTER-8

RECOMMENDATIONS

Conduct training sessions

The SUS results clearly suggest that the users feel the "Need to learn before the use of the system" and the "Need for technical support" as these were among the least three rated system measurement variables. A "Hands on" session is a mandatory for the users to learn themselves and for immediate clarification to their doubts.

Mobile app performance enhancement

To rectify the slowness and hanging issue in the functionality of app by upgrading the mobile application.

E-consultation

There is a provision of E-consultation in mobile app. It should be fully functional for the easy communication.

Information exchange practice

Thereshould be an option of sharing medical records with the other hospitals.

REFERENCES

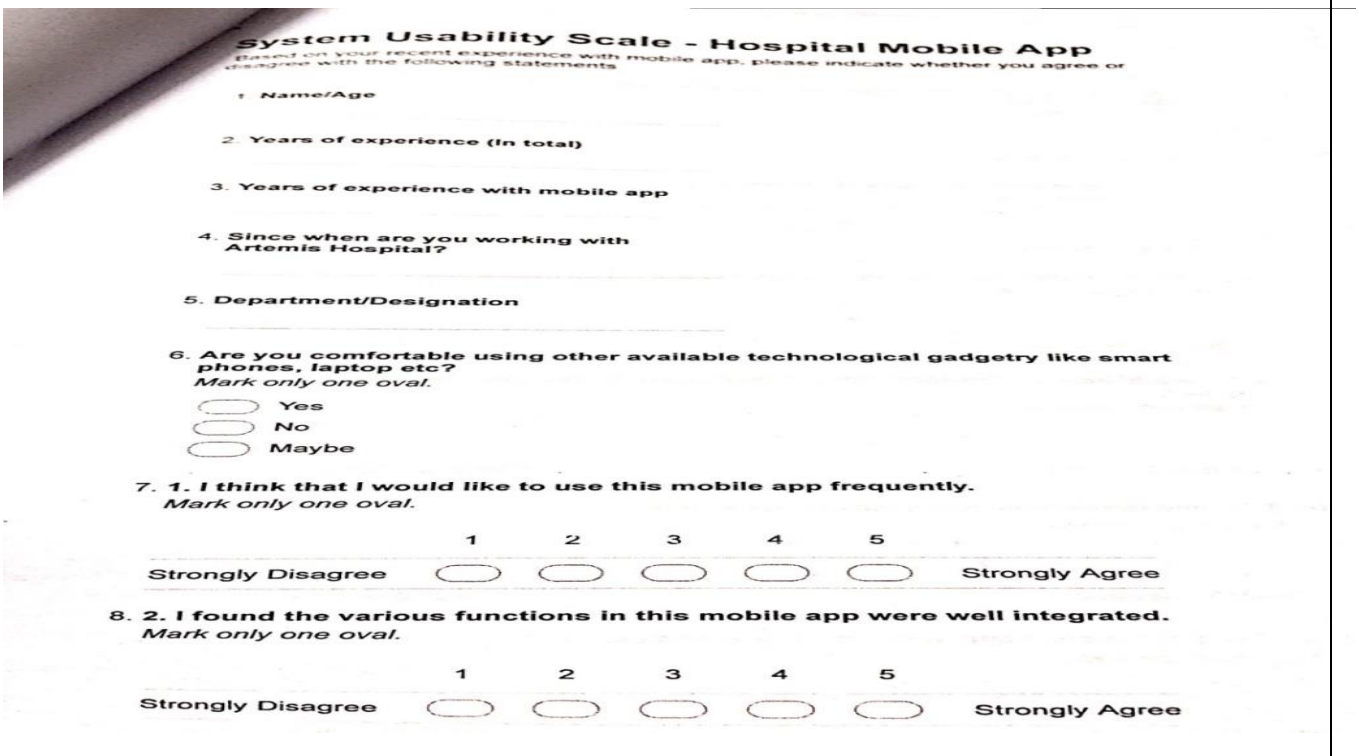
- **https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html**

- **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4029126/Ventola CL. Mobile devices and apps for health care professionals: uses and benefits. PharmTher.**

- **https://www.ncbi.nlm.nih.gov/pubmed/22781312/Mosa AS, Yoo I, Sheets L. A systematic review of healthcare applications for smartphones.**

ANNEXURE

Questionnaire: - System Usability Scale



System Usability Scale - Hospital Mobile App

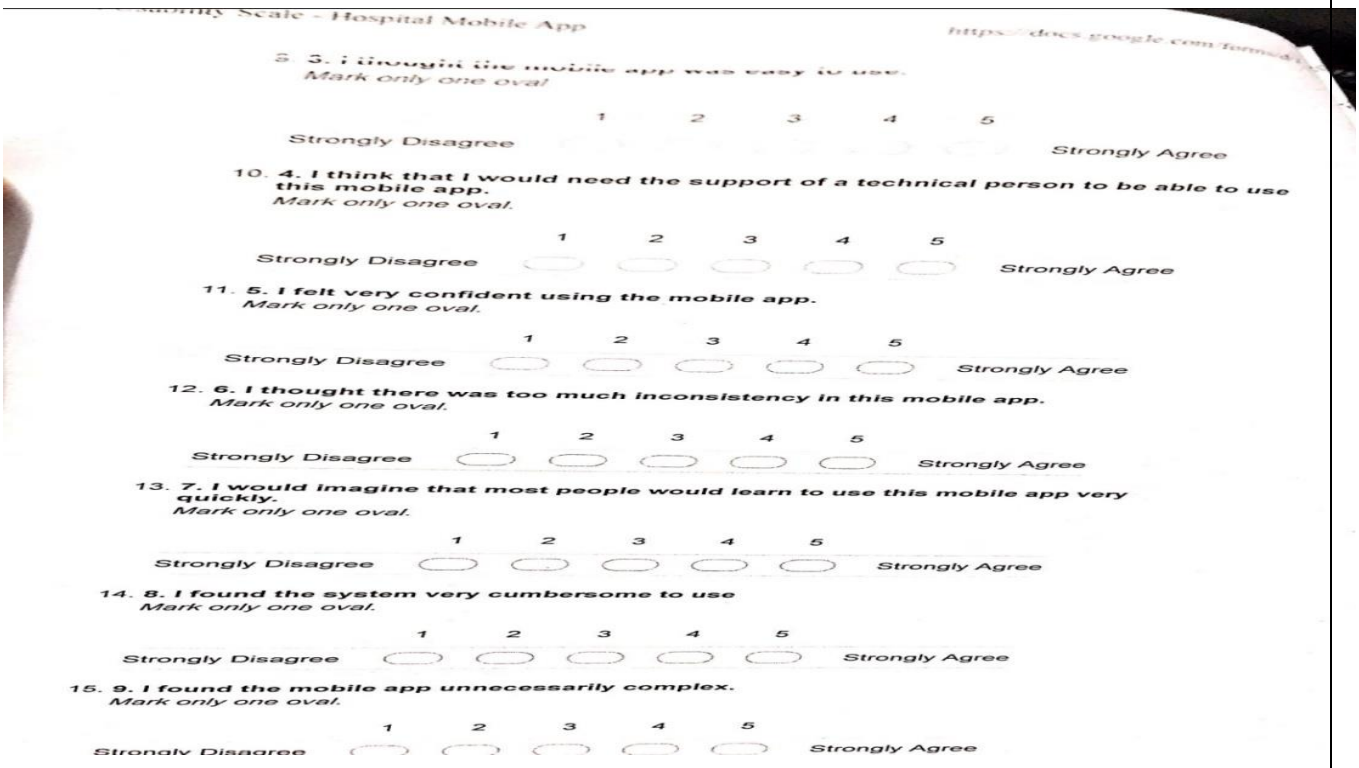
Based on your recent experience with mobile app, please indicate whether you agree or disagree with the following statements

1. Name/Age
2. Years of experience (In total)
3. Years of experience with mobile app
4. Since when are you working with Artemis Hospital?
5. Department/Designation
6. Are you comfortable using other available technological gadgetry like smart phones, laptop etc?
   Mark only one oval.
   - Yes
   - No
   - Maybe
7. 1. I think that I would like to use this mobile app frequently.
   Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

8. 2. I found the various functions in this mobile app were well integrated.
   Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree



...Scale - Hospital Mobile App

https://docs.google.com/forms/d/...

9. 3. I thought the mobile app was easy to use.
   Mark only one oval.

	1	2	3	4	5	
Strongly Disagree						Strongly Agree

10. 4. I think that I would need the support of a technical person to be able to use this mobile app.
    Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

11. 5. I felt very confident using the mobile app.
    Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

12. 6. I thought there was too much inconsistency in this mobile app.
    Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

13. 7. I would imagine that most people would learn to use this mobile app very quickly.
    Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

14. 8. I found the system very cumbersome to use
    Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

15. 9. I found the mobile app unnecessarily complex.
    Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

9. I needed to learn a lot of things before I could get going with this mobile
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

17. **11. Do you feel any gaps and challenges while using this mobile app? If y kindly mention them in brief.**

18. **12. Are there any factors that motivate you to use this mobile app? If ye please elaborate.**

Consent Form

I .....hereby give my consent to participate in the study titled "Evaluation of user satisfaction among mobile app users in Artemis hospital using system usability scale". I have been informed about the title, nature and procedure of study.

I have been given the opportunity to ask all/ any question and I have been given option to withdraw myself from the study at any moment if I don't feel satisfied with the study. Confidentiality: All the data recorded will be kept confidential. Apart from the investigator no one will ever access to the data without my consent. If the data are used for publication in the medical literature or for teaching purpose, no name will be used.

I confirm that Ms. Mahak Rana has explained me the purpose of this research, the study procedure and the possible risks and benefits associated that I may experience. I have read and understood this consent form to let myself participate as a subject in this research project and I am giving the consent wilfully.

Name and signature of subject .....

Name and signature of researcher .....

Mahak Rana Report 2

ORIGINALITY REPORT

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4	Amruta Kulkarni, Deepa Kalburgi, Poonam Ghuli. "Design of Predictive Model for Healthcare Assistance Using Voice Recognition", 2017 2nd International Conference on Computational Systems and Information Technology for Sustainable Solution (CSITSS), 2017 Publication	1%
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