Summer Internship Report

At

Ernst and Young (EY)

(4th April 2022 to 1st July 2022)

A Report

On

Digitalization at AIIMS; Evaluating the Stakeholder's Perspective

By

Dr Sonal Saxena

Enrolment No. PG/21/110

PGDM (Hospital and Health Management)

2021-2023

IIHMR DELHI

International Institute of Health Management Research, New Delhi

Acknowledgements

I, Dr Sonal Saxena, a student of IIHMR Delhi, would like to sincerely express my heartful gratitude to:

1. Mr Prakash Singh, Partner, for granting me this opportunity for understanding the process of gathering the functional and system requirements in AIIMS.

2. Mr Sandeep Jha, Director, for guiding me in my internship journey and providing me the opportunity to work on the research section of AIIMS

3. Mr Ankur Bharti, Director, for guiding me in my internship journey on how to make reports and work on the documentation of the requirements of different departments.

4. Mr Ritviz Agrawal, Manager, for assigning me different tasks and guiding me throughout my journey

5. Dr Gaurav Tomar, Manager, for guiding and motivating me in my internship journey.

6. Dr Anandhi Ramachandran, my mentor at IIHMR Delhi, for support and guidance, without which this training would not have been possible

7. Dr Sidharth Shekhar Mishra, my college mentor at IIHMR Delhi, for guiding me in my journey.

8. Dr Sumesh Kumar, Associate Dean Academics, for providing me this opportunity to learn and work.

9. Mrs Divya Agarwal, Associate Dean, for providing valuable insights and for guiding me for the internship.

And lastly, I would like to thank my college IIHMR Delhi, for providing me this opportunity to learn and grow in the summer training and work in one of the renowned organizations in the industry and for allowing me to learn through practical experience and gain valuable experience that would help me in my future endeavours.

Certificate of Approval

The Summer Internship Project of titled **"Digitalization in AIIMS: Evaluating the Stakeholder's Perspective"** at **"Ernst and Young (EY) Organization"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite 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 report only for the purpose it is submitted.

Name of the Mentor Dr. Anandhi Ramachandran
Designation Associate Professor
IIHMR, Delhi

FEEDBACK FORM
(IIHMR MENTOR)

Name of the Student: Dr Sonal Saxena

Summer Internship Institution: EY & AIIMS.

Area of Summer Internship: Health IT

Attendance: full

Objectives met: yes

Deliverables: Report provided

Strengths: Hard working, sincere, timeliness, self learning. Always smiling. ☺

Suggestions for Improvement: Data Analysis needs to improve.

Signature of the Officer-in-Charge (Internship)

Date: 23/06/2022
Place: N. Delhi

FEEDBACK FORM

(Organization Supervisor)

Name of the Student: Sonal Saxena

Summer Internship Institution: EY LLP

Area of Summer Internship: HEALTH IT (AIIMS)

Attendance: 100%

Objectives met: YES

Deliverables: AS-IS study, Functional Requirement Specs, Best Practices study for functional areas.

Strengths: Perseverance and Commitment to learning and delivering things.

Suggestions for Improvement:

Signature of the Officer-in-Charge (Internship)

Ritviz Agrawal

7897551222

Date: 15 | June
Place: Delhi

EY

Completion of Summer Internship from Ernst and Young (EY)

The certificate is awarded to

Name __Dr Sonal Saxena__

In recognition of having successfully completed his/her
internship in the department of

Title __Tech Consulting__

and has successfully completed her Project on

Integrated Medical University Information

System for AIIMS

Date: __1ST July 2022__

Organization: ____EY____

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

We wish him/her all the best for future endeavors

Organization Supervisor
(RITUIZ AGRAWAL)
(Tech Consulting)

Head HR/Department Head
(Sandup Jha)
(Director – Tech Consultig)

Table of Contents

Acronyms/Abbreviations

|	
ABDM	Ayushman Bharat Digital Mission
AB-PMJAY	Ayushman Bharat Pradhan Mantri Jan Arogya Yojana
AIIMS	All India Institute of Medical Sciences
HA	Hospital Attendant
HIMS	Hospital Information Management System
HIS	Hospital Information System
IMUIS	Integrated Medical University Information System
IPD	In-Patient Department
IT	Information technology
IT PMC	Information Technology Project Management Consultant
LOS	Length of Stay
MBBS	Bachelor of Medicine and Bachelor of Surgery
MLC	Medico-Legal Case
MRD	Medical Records Department
MSSO	Medical Social Service Office
OPD	Out-Patient Department
OT	Operation Theatre
PMU	Project Management Unit
PRC	Patient Registration Counter
UHID	Unique Health ID

1. Observational Learning

EY is a global organization operating in various parts of the world. EY provides consulting, assurance, tax and transaction services that help solve our client's toughest challenges and build a better working world for all. Along with Deloitte, KPMG and PricewaterhouseCoopers, it is considered one of the Big Four accounting firms.

The AIIMS Project has been undertaken by EY to gather the functional and system requirements of AIIMS.

1.1. Introduction

To make AIIMS completely digital, the EY team is providing tech consulting to the AIIMS PMU. The project's aim is to make AIIMS, One AIIMS and have an IMUIS.
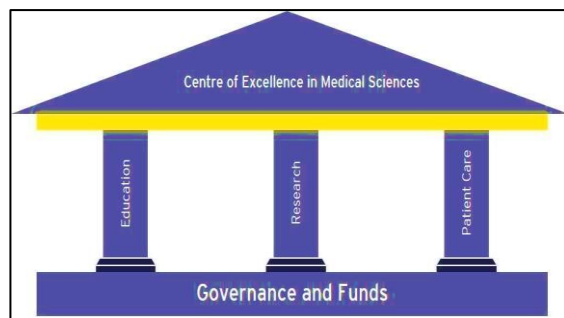
AIIMS New Delhi has a total of 60+ departments, including specialities and super specialties, along with more than nine specialty centres and 10 central facilities.

In AIIMS, there are many operations that are being undertaken in the organization.

- ► Undergraduate and postgraduate teaching in medical and related physical biological sciences
- ► Nursing and dental education
- ► Innovations in education.
- ► Producing medical teachers for the country.

- ► Research in medical and related sciences.
- ► Health care: preventive, promotive and curative; primary, secondary & tertiary.
- ► Community based teaching and research
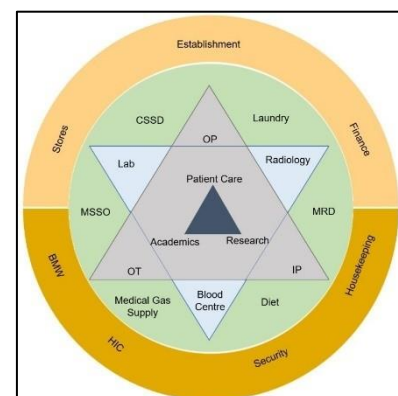
1.2. Mode of Data Collection

A primary and secondary research was conducted to collect the data.

- ► **Primary Research**
  - ► IT PMC team developed the questionnaire-based check list prior to meeting withSPOCs. These check lists were based on:
    - ➢ Industry best practices
    - ➢ Input from the PMU
    - ➢ Past IT projects in AIIMS
  - ► IT PMC prepared complete pilot reports as a critical part of this methodology. This helped in:
    - ➢ Bringing PMU and ITPMC on same page with respect to the structure and depth of reports
    - ➢ Providing opportunity to make course correction with respect to the reports
  - ► Based on the feedbacks of the stakeholders.

- ► **Secondary Research**
  - ► By browsing the information present in the AIIMS Website
  - ► By studying the annual reports of AIIMS
  - ► AIIMS Research Articles/papers/Journals

1.3. General Findings

AIIMS, New Delhi has three important objectives of education, research, and patient care. The core purpose of the "As-Is" study is to understand processes and systems at AIIMS, New Delhi. The next phase of the program "To-Be" functional requirement document builds upon the learnings at the "As-Is" stage and in combination with leading practices in the digital healthcare space, to achieve the vision of One AIIMS at New Delhi.

The general findings including the journey of the patient seen in AS IS Study is shown. Using the tools prepared, and meeting with different stakeholders, the different aspects of a patients journey in AIIMS have been mapped.
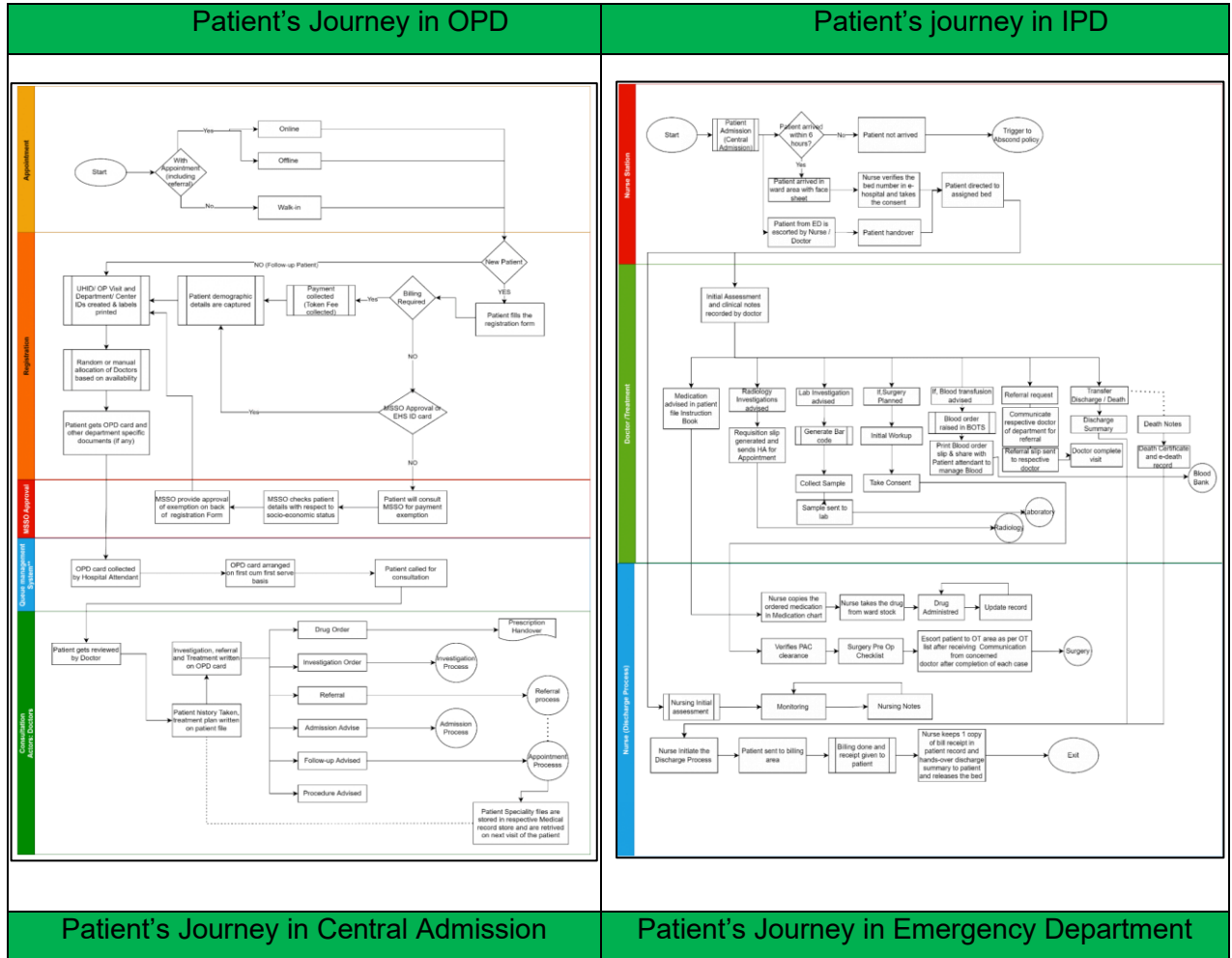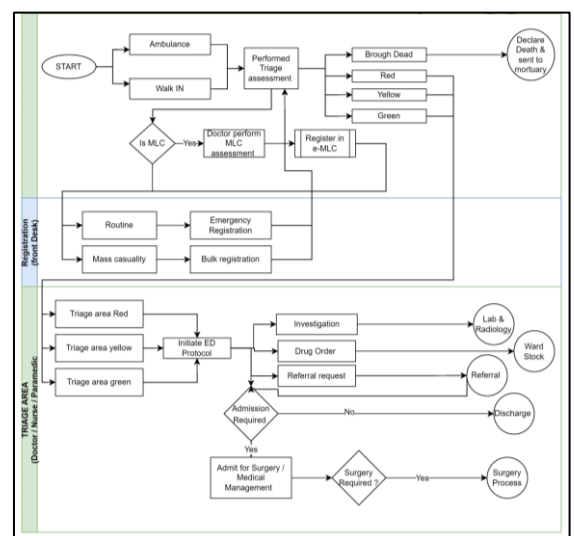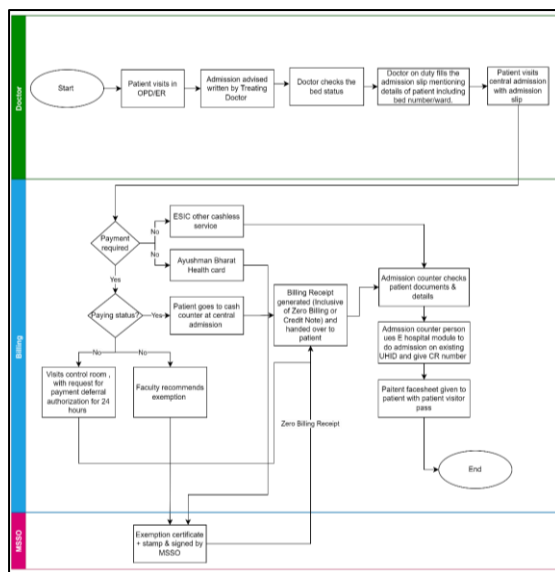
Patient's Journey in OPD	Patient's journey in IPD

Patient's Journey in Central Admission	Patient's Journey in Emergency Department
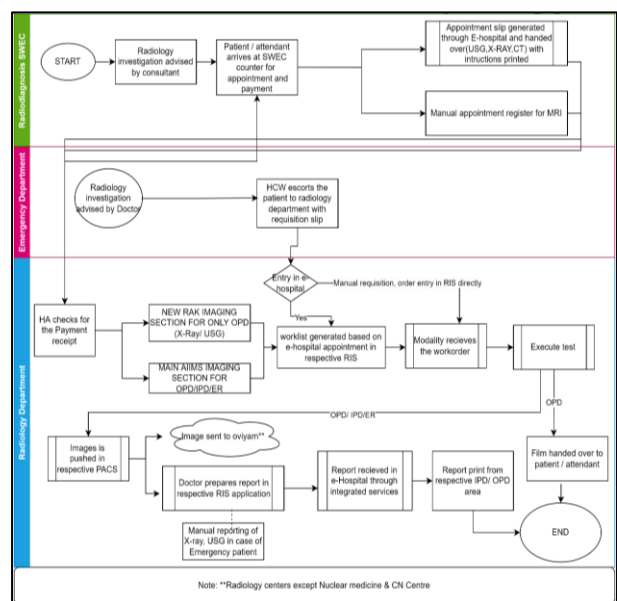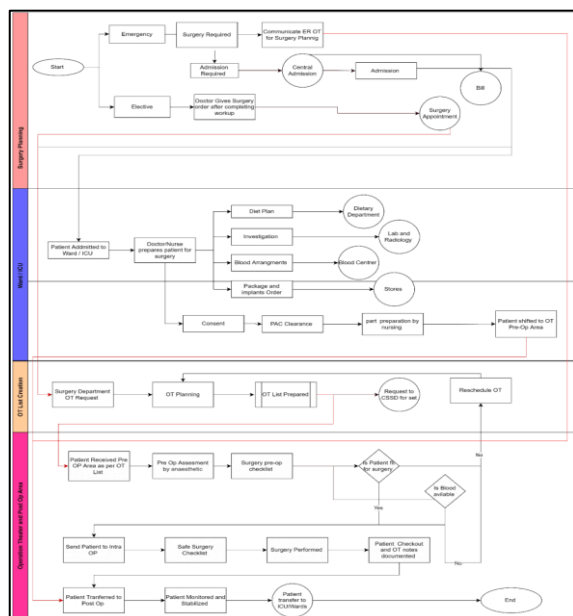
Patient's journey in OT	Patient's journey in Radiology Department
Patient's journey in Blood Centre	Patient's Journey in Laboratory department
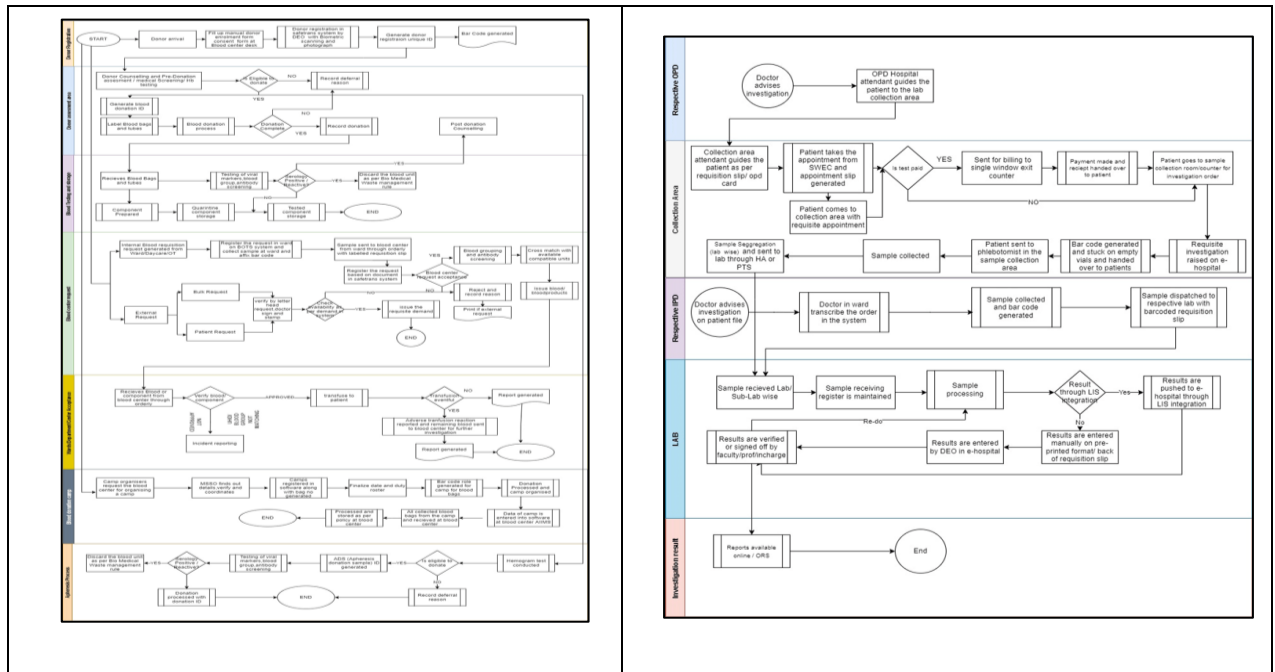
Mapping for To Be Study:

Patient's Journey in OPD	Patient's journey in IPD

Patient's Journey in Central Admission

Patient's Journey in Emergency Department

Patient's journey in OT

Patient's journey in Radiology Department

| Patient's journey in Blood Centre | Patient's Journey in Laboratory department |
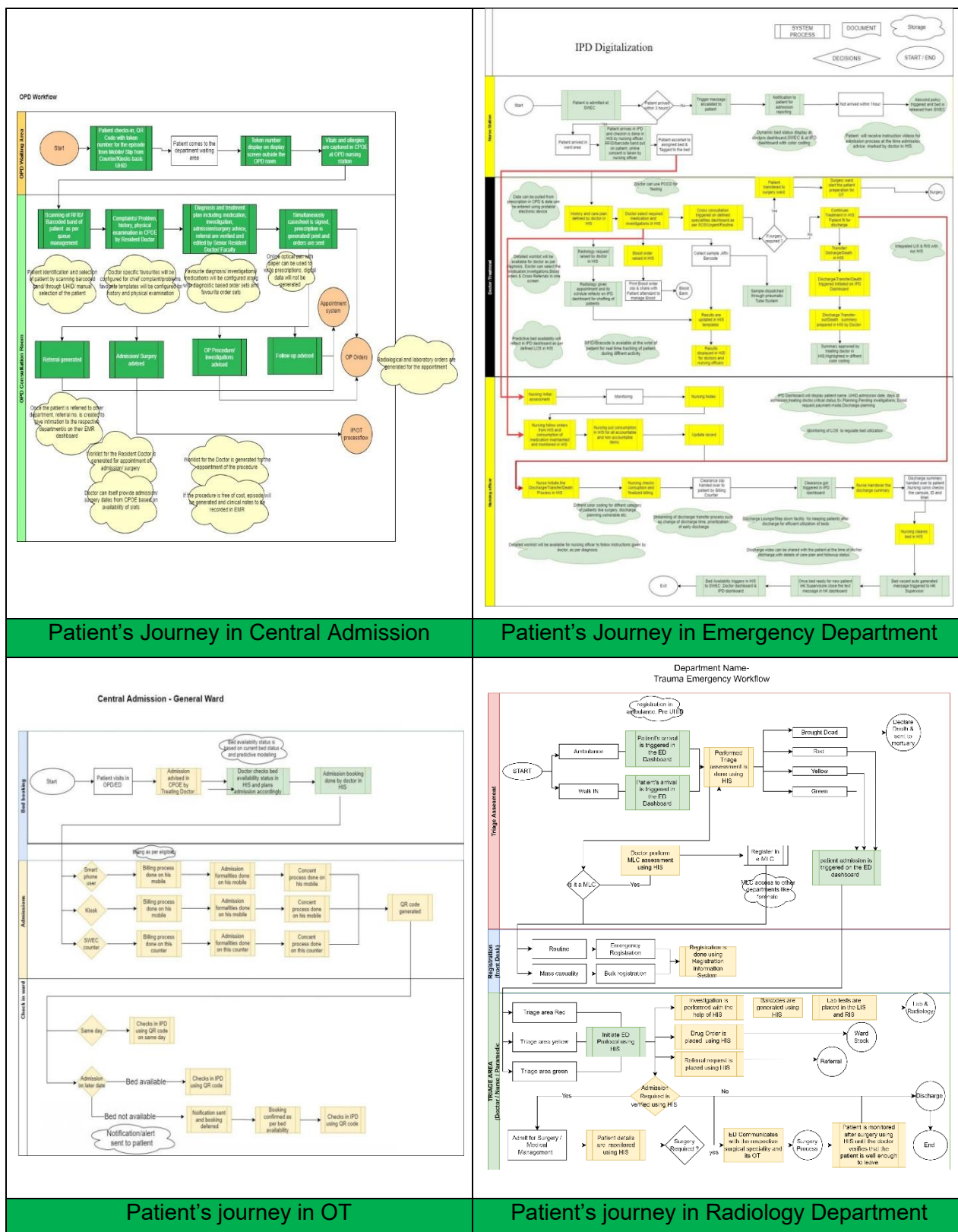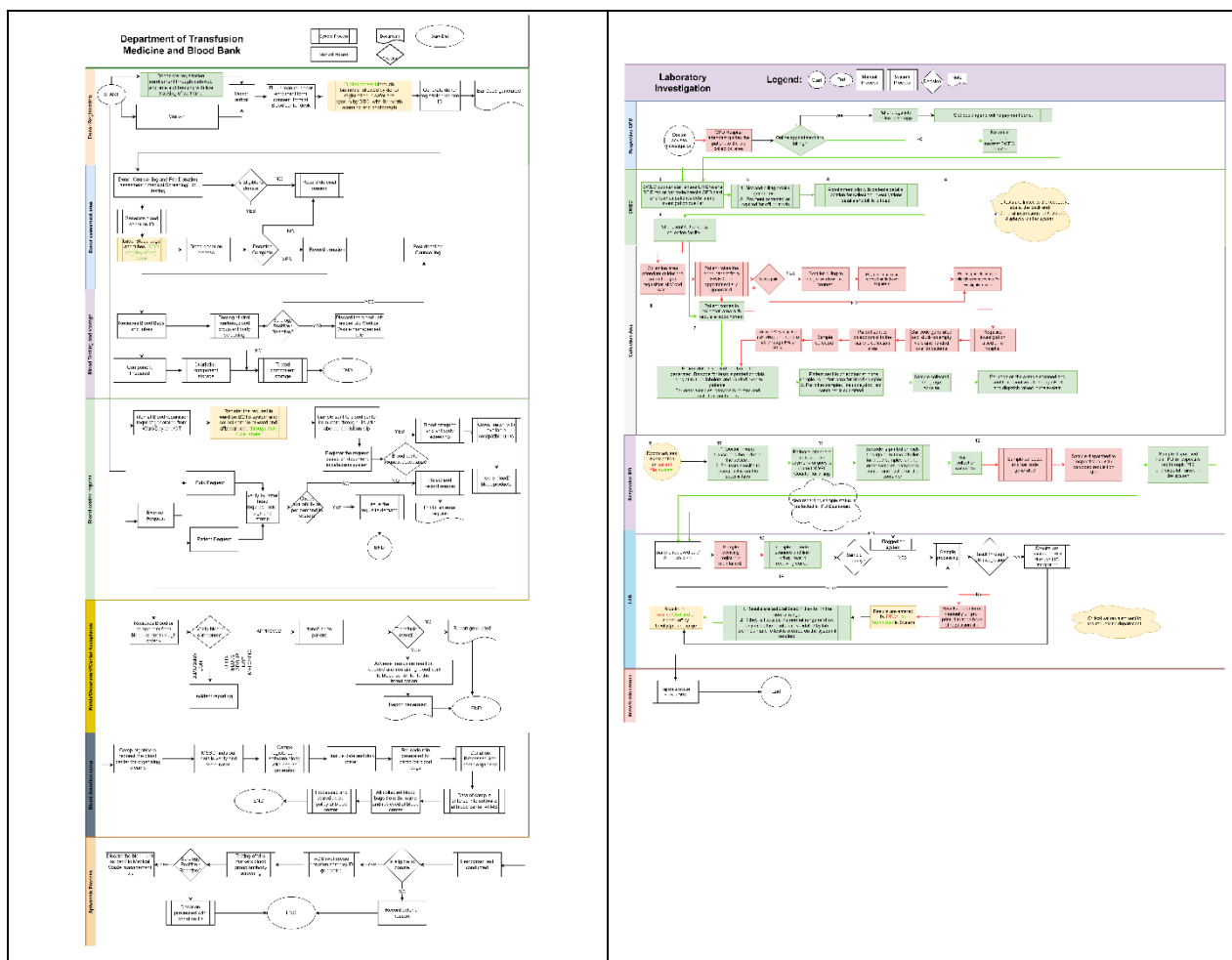
1.4.   Conclusive Learning

After conducting the AS IS Study and TO BE Study it was seen that:

► Tele-screening of patients is required. Absence of it leading to overcrowding in an apex institute. This tele screening would foster growth of regional institutes of importance acrossthe country and build the ecosystem of patient mobility as per the criticality.

► Limited availability of proper IT Infrastructure, IT Human resources skill, and IT policy
  o Core healthcare application is required
  o Limited of integration of existing IT applications.

- Limited of bridge solutions to reduce the burden on clinical human resources.
- Suboptimal utilization of digital space (servers) to host the applications
- Insufficient basic IT infrastructure such as appropriate switches to make available fullcapacity of the internet bandwidth

► Single Sign On system required – Today an employee or a student needs to navigate through multiple systems and for each system the person needs to create separate login. Subsequently person needs to login into multiple IT Applications throughout the lifecycle atAIIMS.

► Obtaining No Demand Certificate is extremely arduous task.

► Limited data integration across centres and main hospital to build the pool of clinical datapoints

► Limited integration between AIIMS IT systems to outside government system.

► Existing IT applications are insufficient to do any analytical work for the research work.

► Insufficient communication and lack of staggered appointment system leading to incorrectpatient expectation

► Insufficient physical infrastructure for patient care.

► Limited skill set in centralized facility to give IT vision and implementation stewardship tothe institute for long term

2. Project Report

Digitalization at AIIMS: Evaluating the Stakeholders Perspective

2.1. Introduction

Healthcare digital transformation is diversifying the way the different stakeholders interact with healthcare professionals, disseminate medical knowledge or make decisions related to diagnosis and treatment of patients[1].

Digital transformation in health care is taking place at an increasingly rapid pace. They can make it more efficient for a health system to manage their population and deliver high-value, high-quality care at a reasonable cost

Research suggests that digital health solutions in conditions could support patients in promoting ideal health behaviour, improve their medication compliance and enhance their interaction with healthcare professionals[3]. This could, in future reduce the LOS in Hospitals.

Rationale

This research was conducted to identify the functional requirements and find the bottlenecks present in the current system.

Gap identification and addressal of the gaps will help in customizing and making a seamless integrated system for the medical university.

"Functional requirements are aimed to communicate what is expected from the system from an end user's perspective, whereas system requirements are aimed at clarifying to developers how the system will be implemented in order to deliver the functional requirements"

Aim

This study is aimed to assess the feedbacks of different stakeholders on their standpoint on digitalization in AIIMS.

Objectives

Primary Objective:

► To assess the perception of the different stakeholders on need for digitalization of the AIIMS

Secondary Objective:

► To obtain feedback from the different stakeholders regarding existing HIS software in AIIMS

2.2. Mode of Data Collection

STUDY DESIGN: Exploratory Study design using quantitative approach

STUDY POPULATION: Patients, Students, Faculty and Nursing Staff in AIIMS. The sample size taken for the study is 40. Sampling method used was Convenience Sampling.

SELECTION CRITERIA: All those stakeholders who have given their consent for participating in the survey have been selected for the study.

STUDY TOOL: Primary Research was conducted using a semi structured questionnaire using a google form.

The questionnaire contained 4 themes

- ► Patient's Feedbacks
- ► Student's Feedbacks
- ► Faculty's Feedbacks
- ► Nursing Officer's Feedbacks

The tool is attached in the annexure.

ETHICAL CONSIDERATION: All the credentials were kept confidential and were used for the purpose of this research only. The questionnaire was completely anonymous. Participation in the research was completely voluntary. Written consent was taken from the respondents for participating in the study.

DATA ANALYSIS: The descriptive statistics was used to analyse the data collected. Microsoft excel and Open Epi were the tools used for data analysis.

2.3. Data Compilation, Analysis, and Interpretation

Data Compilation

Responses were collected in the google form, through which the responses were exported to Microsoft excel after which the data analysis was conducted**.**

The responses included:

In the study conducted, 10 Faculty, 10, Nursing Officer, 10 Patients and 10 Students gave their consent and participated in the research.

Designation
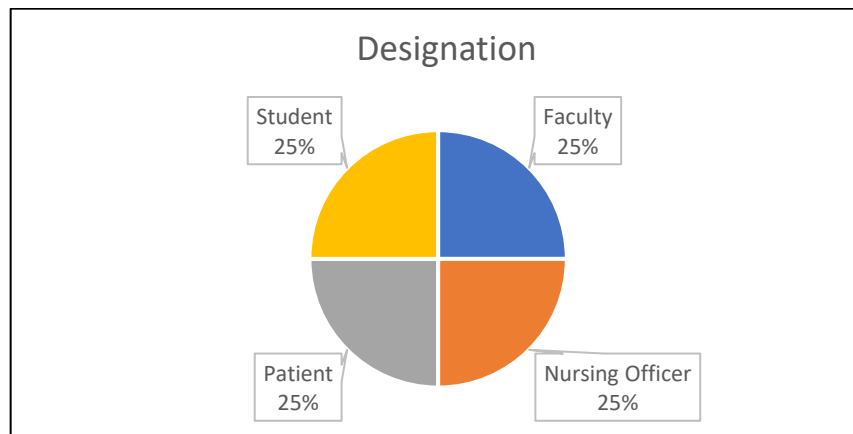
Out of the 40 responses collected, 95% of the participants were in favour of making AIIMS digitalized.
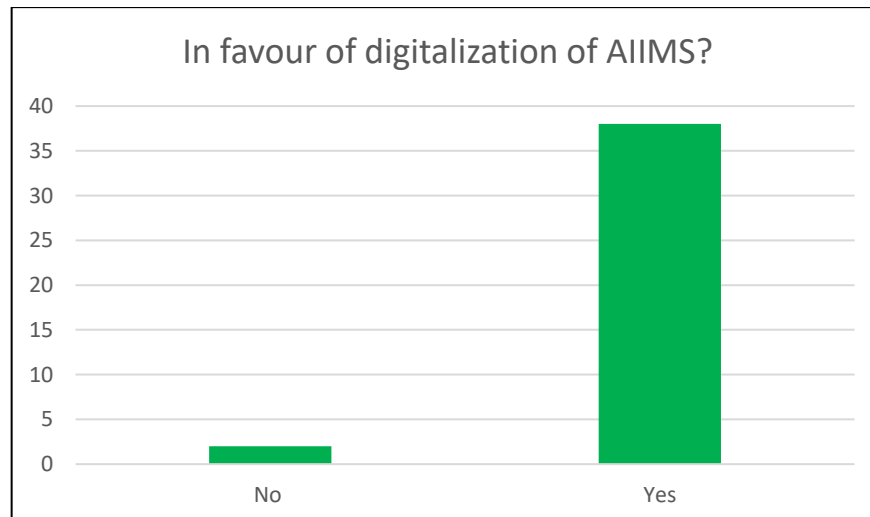
Patient:

► In 80% of the patients, it was seen that they were dissatisfied with the waiting time at AIIMS.

Dissatisfied	Moderate	Satisfied
8	1	1

► 70% of the patients were dissatisfied with the billing process at AIIMS.

Dissatisfied	Moderate	Satisfied
7	2	1

► 90% of the patients were dissatisfied with the registration process at AIIMS.

Dissatisfied	Moderate	Satisfied
9	1	0

► 80% of the patients were dissatisfied with the investigation process at AIIMS.

Dissatisfied	Moderate	Satisfied
8	2	0

► 80% of the patients conveyed that it took them more than 2 hours to complete the registration process.

Time taken to complete the registration process

- 1 hour-2 hours
- More than 2 hours
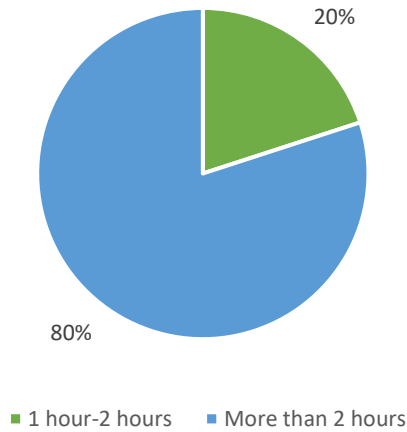
► Only 20% of the patients had booked an appointment online, rest preferred to take appointment physically at counters.

Appointment

- Counter Window
- Online Portal
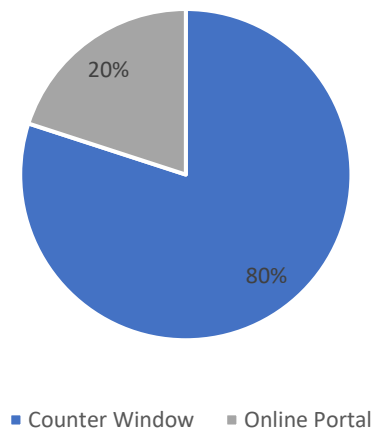
The feedback given by the patients are shown in the table below.

S. No.	Patient's Feedback
1.	Queue management is an issue Appointment management is anissue Surgery waiting

	time is approximately 3 years
2.	Display direction for OPD rooms
3.	All kinds of reports should be online, patient can be print it from website portal. Senior citizens will be treated on priority. Every process should have a fixed turnaround time , for Any delay or Loosfall somebody will be responsible or Answerable for online appointment should have 100 rs refundable fee. Fees refunded aftersuccessful patient visit, it may be give fall in fraud appointments.
4	Reduce waiting Time
5	Please Quick response
6	Procedure waiting time is more. 9 months waiting for treatment
7	Please your hospital staff no doctor room entry without queue because we are waiting in queue, or your hospital staff memberenter without queue so we are waiting 5 hour hours in queue
8	I have many suggestions but want to give a suggestion that please improve the arrangements that's why more people can't gathered oncounters and OPD hall. A lot of people gathered everywhere.
9	Even after taking an online appointment, I have to come to aiims at 4.00 am so I can get a slot through registration
10	I dont get any notification about when my results of tests are available

Faculty:

► The faculty spent about 20-40% of their time on patient care,20- 30% of their time in Academics, 20-30% of their time on research and 20-40% of their time in performing administrative tasks.

Time spent on different Activities
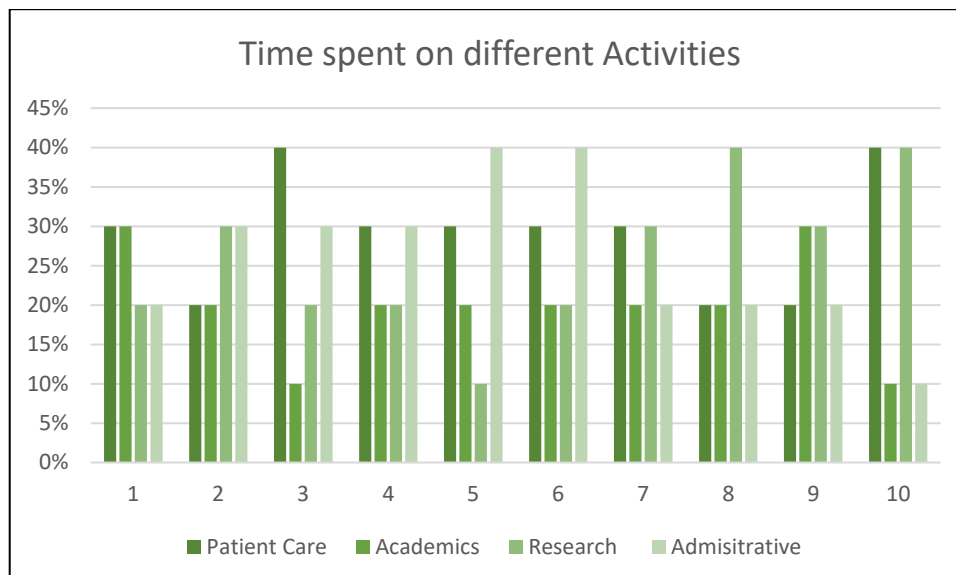
► Even though there are many modules present in eHospital application in AIIMS, most of the faculty are only aware of about 1-4 modules.

How many modules of eHospital are you aware of?

```
7
6 |      ┌────┐
5 |      │    │
4 |      │    │        ┌────┐
3 |      │    │        │    │        ■ Total
2 |      │    │        │    │
1 |      │    │        │    │
0 └──────┴────┴────────┴────┴──────
          1-3            3-4
```
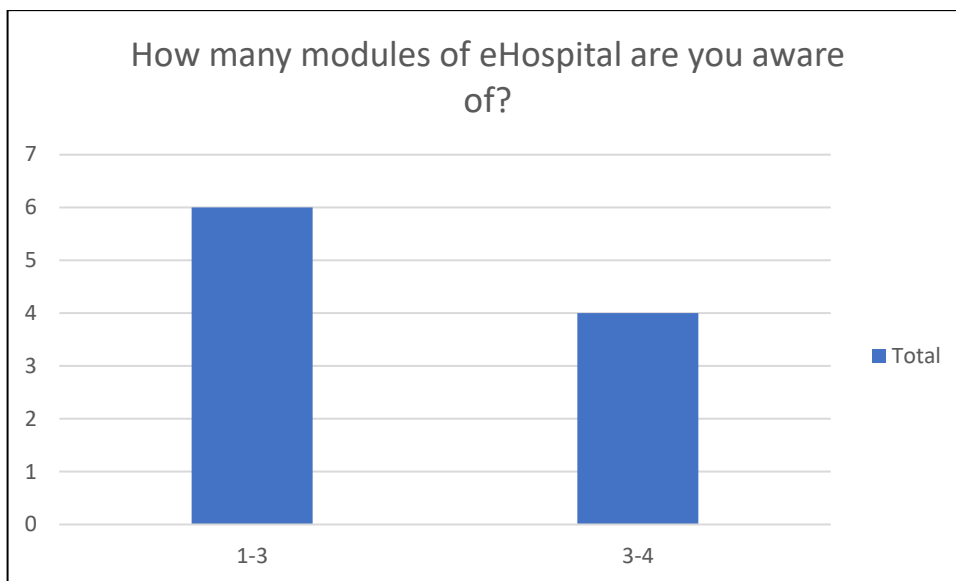
► 70% of faculty have difficulty in using the e Hospital App. It was also observed that 80% of the faculty used different applications at individual level.

Is it easy to use eHospital?

```
8
7 |                            ┌────┐
6 |                            │    │
5 |                            │    │
4 |                            │    │
3 |      ┌────┐                │    │
2 |      │    │                │    │
1 |      │    │                │    │
0 └──────┴────┴────────────────┴────┴──────
          No                   Yes
```

Do you use other Applications at individual level?
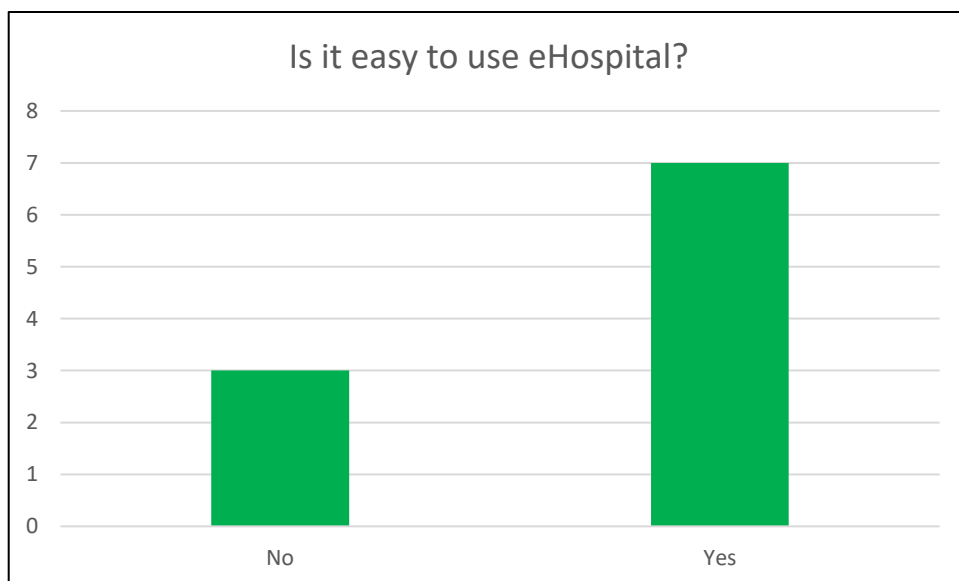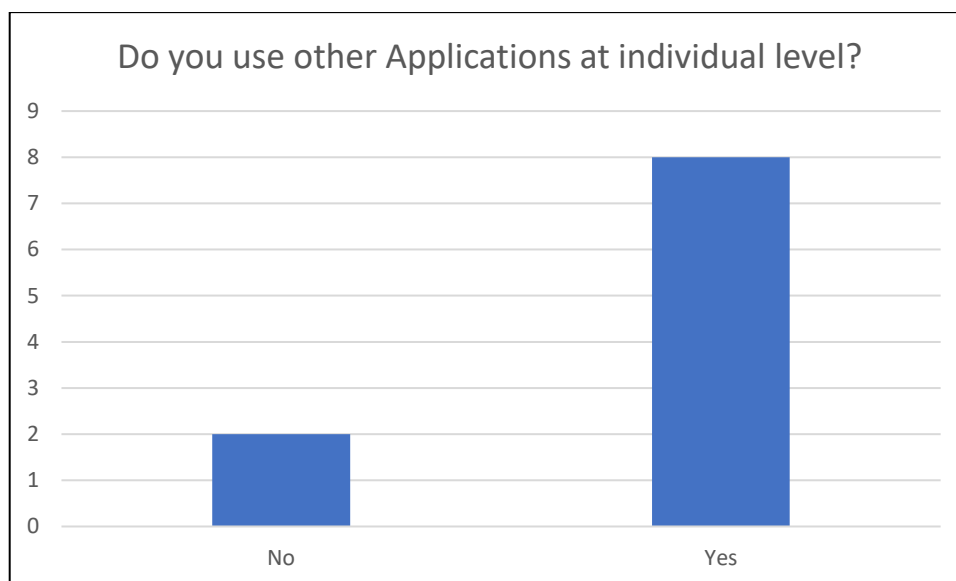
The feedbacks of the faculty are depicted in the table below:

S.No	Faculty Feedback
1	There are many more important areas of patient care which have more priority than IT system. It is also important. However, hospital isnot patient friendly and was never built as a primary care hospital. It was made as tertiary referral hospital. It is better to bring that status back rather than doing this IT service first

|	
2	PAC & RIS & Laboratory modules need special consideration. (1) Needs to be made user-friendly for clinicians as well as Lab Physicians. (2) Needs to be made interactive between Laboratories and Clinicians to facilitate one to one exchange of information for patient care. (3) Bulk information sharing regarding lab breakdowns orprocess changes, or any other information desired to be shared by theLab must reach all users. (4) Laboratories and Blood Collection facilities should be relieved of verifying payments. Barcode generationprocess may be evolved to accommodate payment verification. (5) Payment process if any to be smoothened and digitalised. (6) Test request process to be modified to accommodate for add-on testing onthe same barcode within stipulated time to decrease repeated blood sampling of patients. (7) In case of Edits in released reports patient (for OPD reports) and concerned clinician (for IPD) to be informed by SMS. (8) Real time updation of patients' IPD location and Treating Physician should be available to Labs to facilitate communications regarding critical results and possible pre-analytical problems. (9) Several other suggestions have already been given to EY team duringverbal interaction.
3	We should have all the project accounts related information on theweb
4	Should have EMR system which will be easy to operate
5	Robust learning management system and MS office is the dire need of the institute
6	Reliable pan AIIMS single HIS RIS PACS at the earliest. Filmless and paperless Radiology services. Biometric attendance and display of IDcards mandatory to all employees. Smart ID card enabled access to non-public areas
7	BOTS module for acquiring blood is not functional in department of plastic surgery
8	I wish to have student attendance, rotation plan, class schedule, timetable, marks calculation and consultation with doctor at EHS,scheduling investigations online
9	Currently students conduct a large no of theses as part of their MD/MS/DM/MCH/PhD. We should have online database that is hosted on the institute server. The student should be able to create his/her case recording form and enter data. Once data is entered, it is transmitted to the server. Any change thereafter is tracked with audit. The progress is available as

	Dashboard indicators to the guide. Wouldimprove quality a lot. Pl ensure data privacy. Currently anyone can access anything. Make the provision of very robust hardware and internet connection. That is a major challenge. Currently, a lot of data is in text format. Need to collect information in appropriate form for easy accessibility
10	Automatic faculty access through single log in so that multiple log infor EHS, salary, GPF, exam, saral email etc are not needed. Like google, single password

Nursing Officer:

► Nursing officer spends about 20-40% of their time in patient care. Rest of their time is occupied in doing other activities.

How much time do u spend on patient care
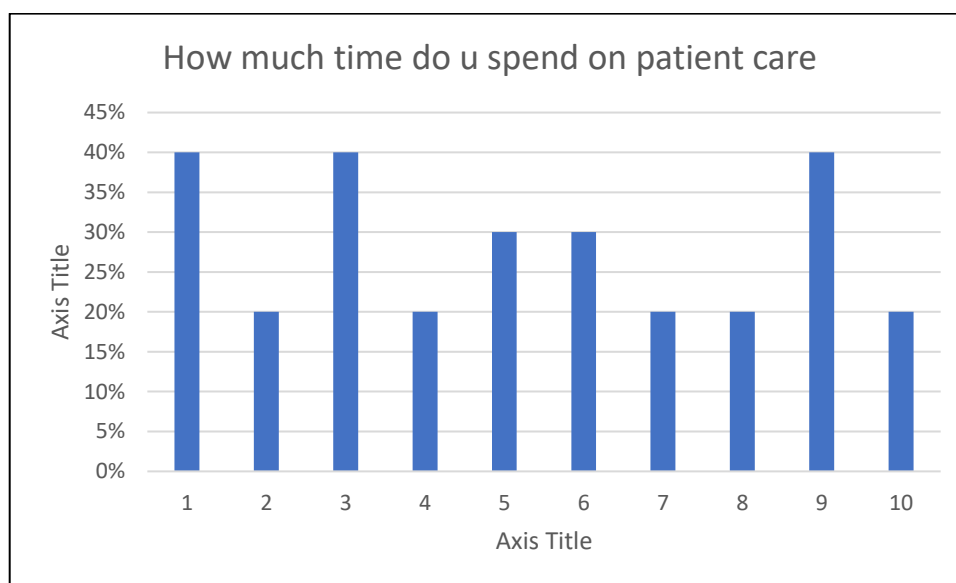
► According to the nursing officer, if AIIMS is digitalized, they would be able to spend 70-90% of their time on patient care activities.

How much time would you be able to spend on patient care if administrative tasks are digialized?

50-70%	3
70-100%	7
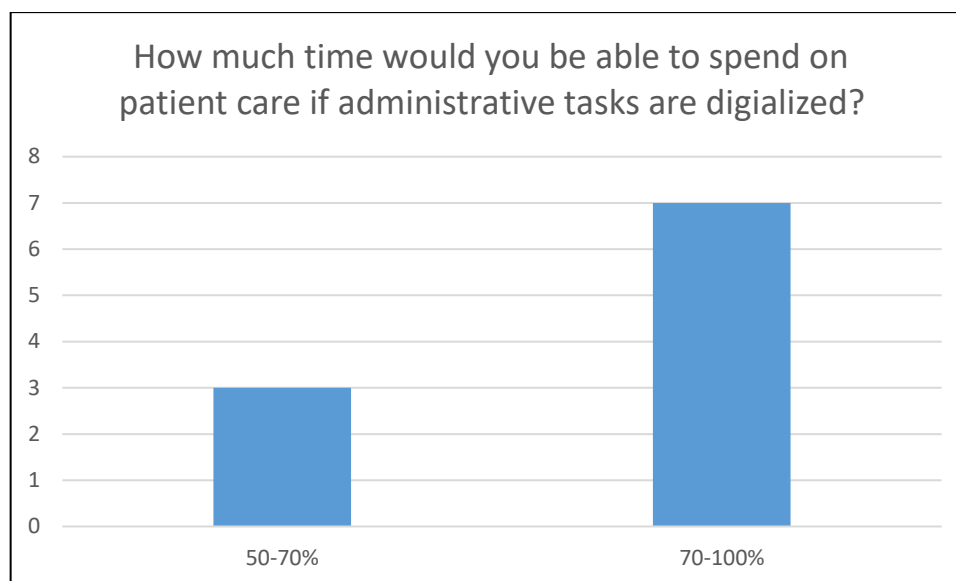
► 80% of nursing officers conveyed that it was difficult to use eHospital.

Is it easy to use eHospital?

No	8
Yes	2
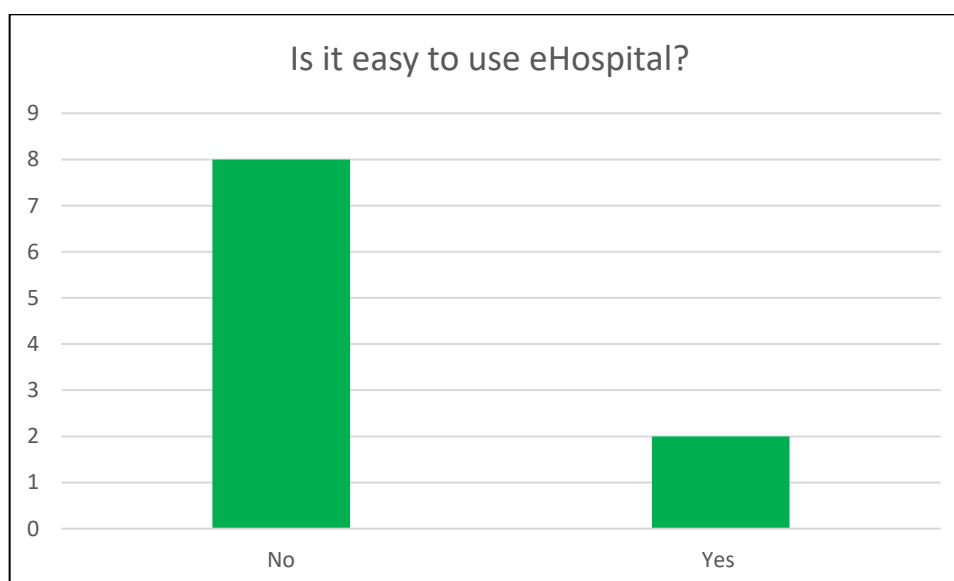
► All the Nursing officers have stated that the IT infrastructure in the hospitals is inadequate.

Easy	Moderate	Difficult
0	0	10

The feedbacks given by the nursing officer is mentioned below:

S. No.	Nursing Officer's Feedback
1.	There should be one integrated system for the entire hospital services.
2.	Tuition fee, application for leaves (EL, CL, CCL)
3.	e-Hospital needs lots of improvisation. Please try to integrate all the application with so or fingerprint login. Try to not to use paper for printunless its required.
4.	If we are using IT systems, paper works should be replaced. Currentlywe are using online and offline of the same.
5.	Multiple login IDs to be avoided All leave application should be onlineEach employee should know about the status of their each and every application status like leave, reimbursement, LTC, status Each employee should be able to get their remaining leave status on a singleclick EHS book entry should be available online All service file related status to be visible online Online NOC application and download
6.	Kindly provide resources for proper work every one doctors engineeringdepartment other service group also include internet facility should be 24hours facility classes for HA SA and for junior doctors also eg BMW INFECTION CONTROLL ETC
7.	Complete digital duty roster, submission of leave applications withoutsending peon book, any other request like NOC, leave by nursing officers, complaints & requests of maintenance services, facility for monitoring patient's status from counter by all the staffs on duty, recording and reporting systems of patient's status & treatments, alertnotification of patients who are on mechanical ventilator, request to mortuary to take dead bodies, giving over to supervisors, digital deployment system, receiving all hospital circulars to CNO office & forwarding it to respective ward ANS on time
8.	Kindly Make leave forms completely online.
9.	There is more and more need IT sector become AIIMS prime institute ofIndia and I also like to save paper and save to Nature
10.	The expiry date of the medicine should be visible when we put an indent in medical store indent.so that indent can be made accordingly.Sometimes we put large amount and it comes to near 1-2 months expiry in issue slips.

Student:

► 70% of the students have conveyed that it is difficult to acquire their IDs from different facilities.

How difficult is it to get IDs?

Difficulty	Value
difficult	8
Moderate	2
Easy	0
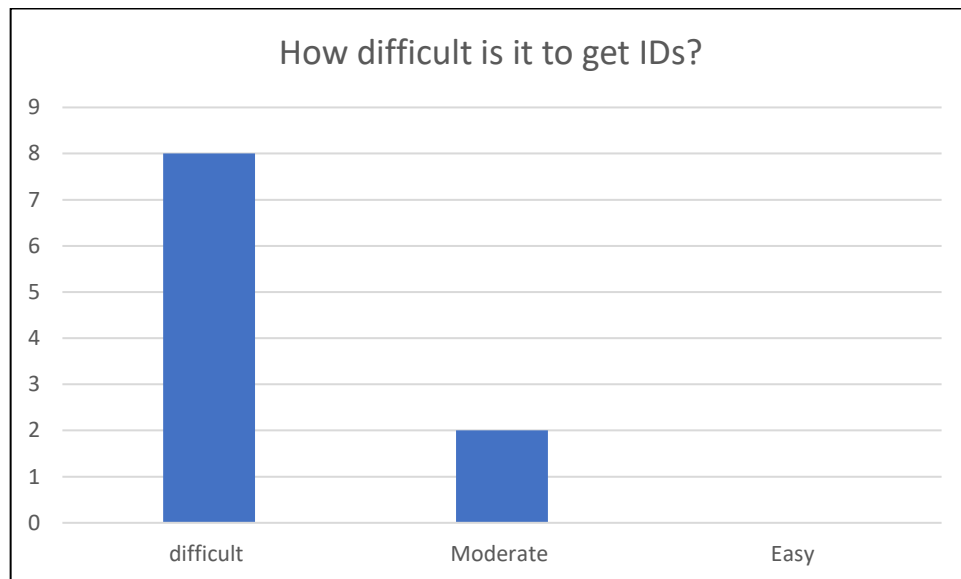
► They also face the issue of multiple IDs.

Yes	No
10	0

► 80% of the students felt that SARAL, a learning management software in AIIMS, is difficult to access.

Is it easy to use SARAL?

	No	Yes
Value	8	2

►
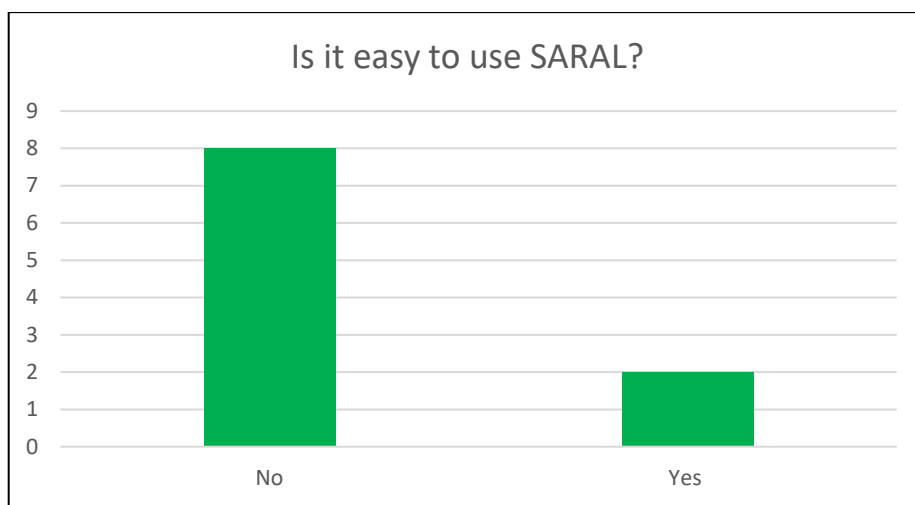
► 80% of students find it hard to receive the no objection certificate (NOC) after course completion.

Is it easy to issue NOC?

	No	Yes
Value	8	2
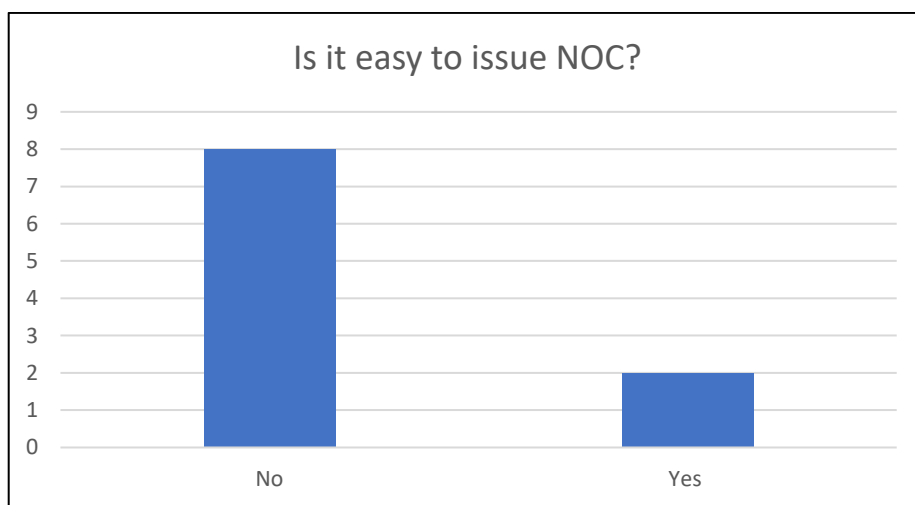
The feedbacks given by the students have been captured in the table below.

S. No.	Student's Feedback
1.	It should reduce the amount of time spent on manual processes.
2.	One integrated system will help in saving time and helping in creating one ID for all activities.

3.	i can directly be in contact with the seniors. Reducing the paper prints and storing everything in the system will help in securing the file
4.	Paperless flow of work will help in keeping track of the data and securing them. and retrieval is also easy
5.	Hostel room allotment should be easier
6.	managing my time table will be easier and cancellation of class can be pre informed
7.	Data is manually searched for pg students
8.	Making the leave management system more user friendly.
9.	streamlining of the process of posting at UG Level. there should be an online grievance redressal system in the university
10.	Accessing records for research should be possible.

Data Analysis:

Patient:

1. **Type of patient vs Registration time**

	High	Low	TOTAL
New Patient	7	1	8
Referral Patient	1	1	2
TOTAL	8	2	10

P= 0.1181   Odd's Ratio= 5.292

2. Type of Patient vs waiting time

	High	Low	TOTAL
New Patient	6	2	8
Referral Patient	0	2	2
TOTAL	6	4	10

P= 0.02641   Odd's Ratio=undefined

3. Type of patient vs type of appointment

	Online	Walk in	TOTAL
New Patient	1	7	8
Referral Patient	2	0	2
TOTAL	3	7	10

P=0.007863   Odd's Ratio=0

4. Type of Patient vs Type of payment

	Cash	Card	TOTAL
New Patient	7	1	8
Referral Patient	1	1	2
TOTAL	3	7	10

P=0.1181   Odd's Ratio=5.292

5. Type of appointment vs type of payment

	Cash	Card	TOTAL
Online	1	1	2
Walk in	7	1	8
TOTAL	8	2	10

P=0.1181   Odd's Ratio=0.189

6. Type of appointment vs satisfaction level with current system

	Dissatisfied	Satisfied	TOTAL
Online	2	1	3
Walk in	6	1	7
TOTAL	8	2	10

P=0.2451   Odd's Ratio=0.378

Key bottlenecks found in the feedbacks of patients:

Patient's Feedback on current system

- Queue Management is Poor
- No Display Directions for OPD
- All reports cannot be viewed in the system
- Waiting time is a lot
- Waiting time for Procedures/surgeries is more(>9 months)
- Response isn't quick
- Overcrowding in the Registration and OPD areas
- Online appointment system needs to be improved.
- No notification/alert system
- Have to walk for 1-2km for billing

Faculty:

1. **Experience vs Awareness of e Hospital modules**

	<3 Modules	3-5 Modules	Total
>10 years	4	2	6
<10 years	1	3	4
Total	5	5	10

P= 0.09850   Odd's Ratio= 4.918

2. **Experience vs Access to the e Hospital Modules**

	Difficult	Easy	Total
>10 years	5	1	6
<10 years	3	1	4
Total	8	2	10

P= 0.3734 Odd's Ratio= 1.581

3. **Experience vs Patient care management in IT System**

	Yes	No	Total
>10 years	4	1	5
<10 years	2	1	3
Total	6	2	8

P= 0.3366 Odd's Ratio= 1.826

4. **Experience vs Research management in IT System**

	Yes	No
>10 years	5	1
<10 years	2	1

P= 0.2854 Odd's Ratio= 2.236

5. Experience vs access to medical records in IT System

	Yes	No
>10 years	6	0
<10 years	4	0

The faculty wanted the following in the future IT System:

What features would you want in IT System?

Feature	Count
Ability to manage the progress of the research project	9
Ability to manage academic classes	8
Ability to manage student log books	8
Ability to access patient medical records	10
Ability to conduct tele-consultation	6
Ability to manage patient care management	8
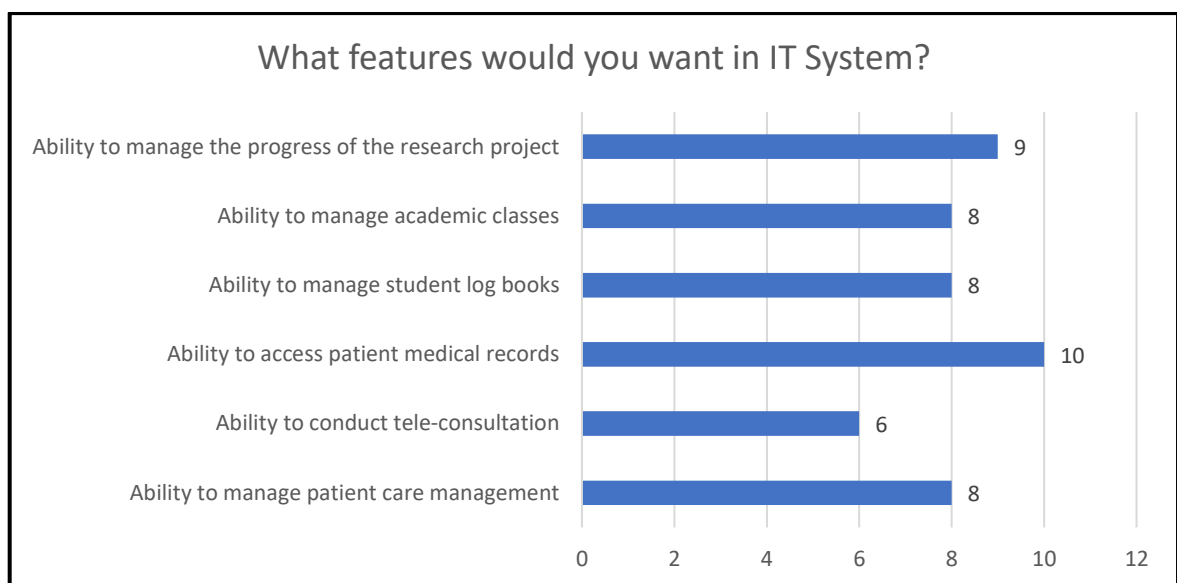
Key bottlenecks found in the feedbacks of Faculty:

Faculty's Feedback on current system

- Time Spent on Administrative work is more
- PACS, LIS and RIS are not user friendly
- It is difficult to access medical records of patients for research
- No data management tools for research
- No provision of notifying students about rescheduling of classes
- No EMR System
- eHospital is very slow
- No interoperability present between the existing systems
- Have to take attendance, assignments etc physically
- Patient tracking is very difficult

Nursing Officer:

1. Experience vs Access to e Hospital

	Difficult	Easy	Total
>10 years	5	1	6
<10 years	3	1	4
Total	8	2	10

2. Experience vs IT Infrastructure availability

	yes	no	Total
>10 years	6	0	6
<10 years	4	0	4
Total	10	0	10

3. Experience vs Using e roster management

	yes	no	Total
>10 years	6	0	6
<10 years	4	0	4
Total	10	0	10

The breakdown of the responses received by the nursing officer:

How much time do you spend on daily activities?

Time	Patient care	Others
10%	0	2
20%	2	2
30%	6	2
40%	2	3
50%	0	0
60%	0	5
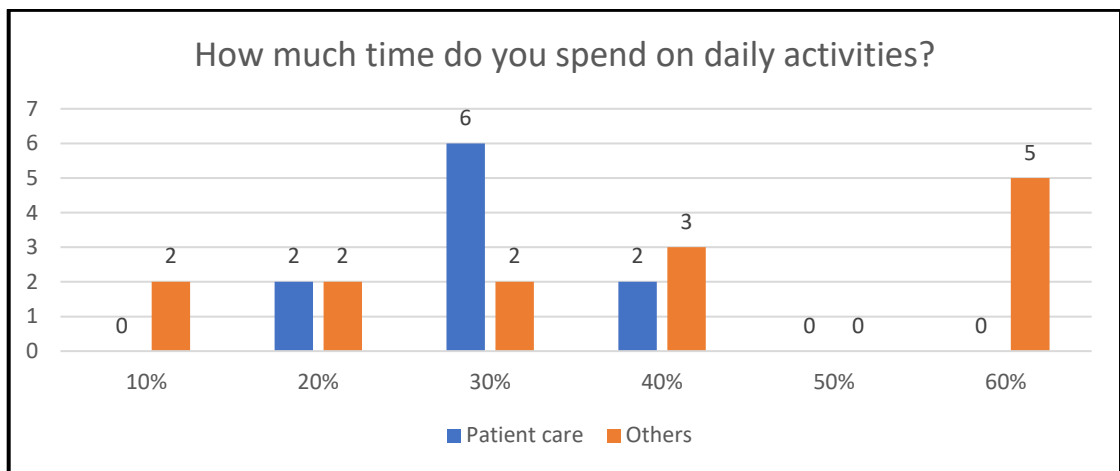
The breakdown of the features wanted in IT System by Nursing Officers:

What features do you want in your IT system?

Feature	Value
Other	9
Notification of critical alerts for lab tests	8
Tracking of deployed HA/SA	7
Complaint management redressal for various systems	7
Patient discharge process tracking	10
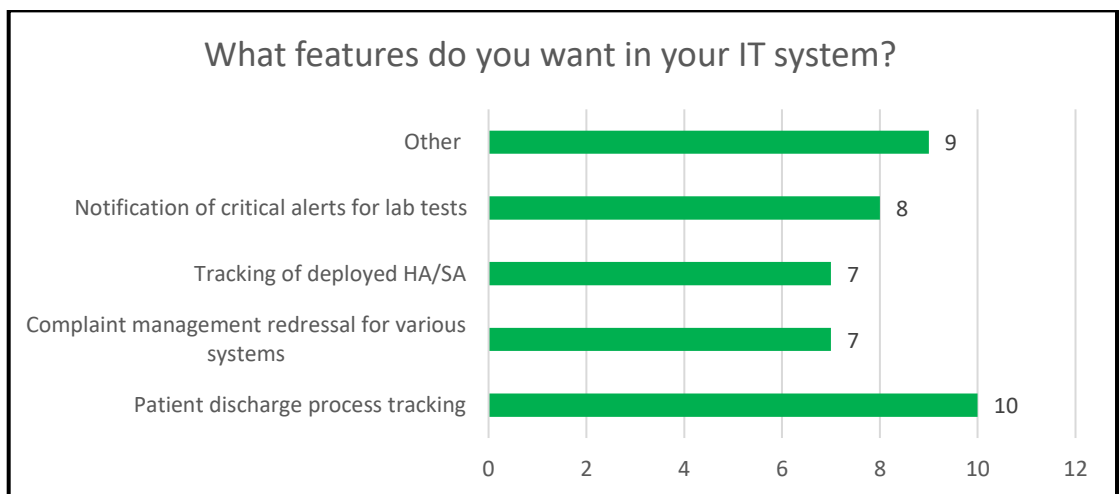
Key bottlenecks found in the feedbacks of nursing officer:

The systems present in AIIMS are not integrated with each other

Duplicity of work

There is no provision for leave management, fees payment online

Hybrid maintenance of records

Multiple Login ID

No grievance/complaint portal. Must manage manually

Roster management is done on "gatta" manually

Resources are scarce

Indenting is done manually

Expiry date should be present while indenting

Nursing Officer's Feedback on current system

Student:

1. Experience vs Issuance of NOC

	Difficult	Easy	Total
UG	3	0	3
PG	4	0	4
Post PG	3	0	3
Total	10	0	10

2. Experience vs ID cards availability

	Difficult	Easy	Total
UG	2	1	3
PG	4	0	4
Post PG	3	0	3
Total	9	1	10

3. Experience vs access to SARAL

	Difficult	Easy	Total
UG	3	0	3
PG	3	1	4
Post PG	2	1	3
Total	8	2	10

The breakdown of the responses received by the students
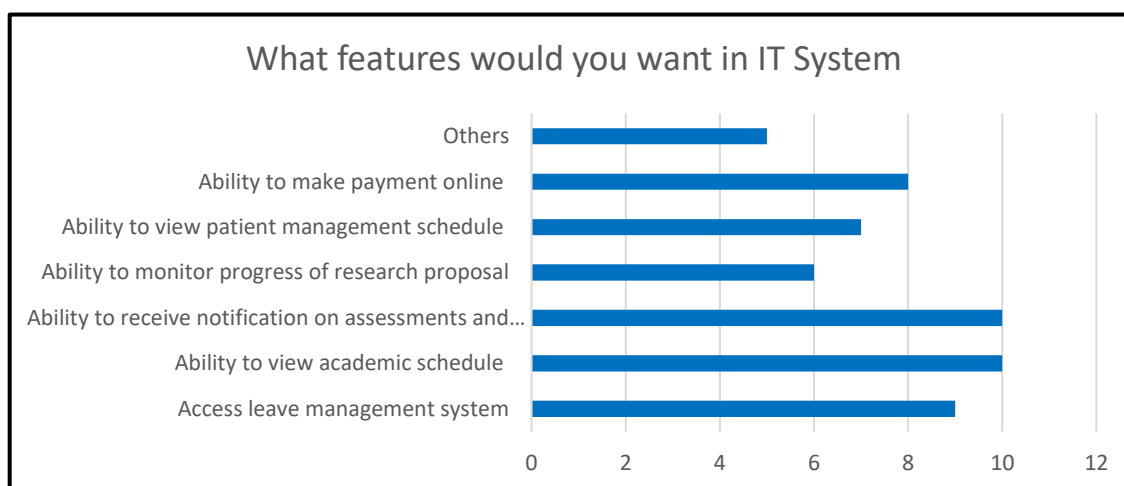
Key bottlenecks found in the feedbacks of students:

Student's Feedback on current system	Too much time is pent doing manual processes
	Cannot contact the faculty directly
	Hostel Room Allotment is a long process and is done manually
	Issuance of No due certificate/No objection certificate is difficult
	Multiple Login ID
	No alert in case of change in academic schedule of classes
	Data retrieval and storing is done manually.
	Resources are scarce
	No online grievance redressal system
	Accessing records is difficult

Data Interpretation:

Patient:

- ► Overcrowding was the major bottleneck found in the responses of patients. Research shows that overcrowding may affect patients' symptoms, clinical outcome, and satisfaction. It can also affect physician's effectiveness, causing frustration among medical staff[7]

- ► There should be the provision of e queue management system, with a token display system which would guide the patient on where they need to go. Research shows that application of a queue management system in the waiting rooms can reduce the actual and perceived waiting times and increase the patient satisfaction.[8]

Faculty:

- ► EMR/EHR System should be implemented. Research shows that EHR use enhanced patient care overall helped them access a patient's chart remotely, and alerted them to a potential medication error and critical lab values[9]

- ► Learning management system should be implemented which would help the faculty in managing the academic schedules and attendance, saving time. Research shows that It helps lecturers and teachers to create and integrate course materials, align content and assessments, and create customized tests for students. In addition, they can articulate learning goals and track studying progress.[10]
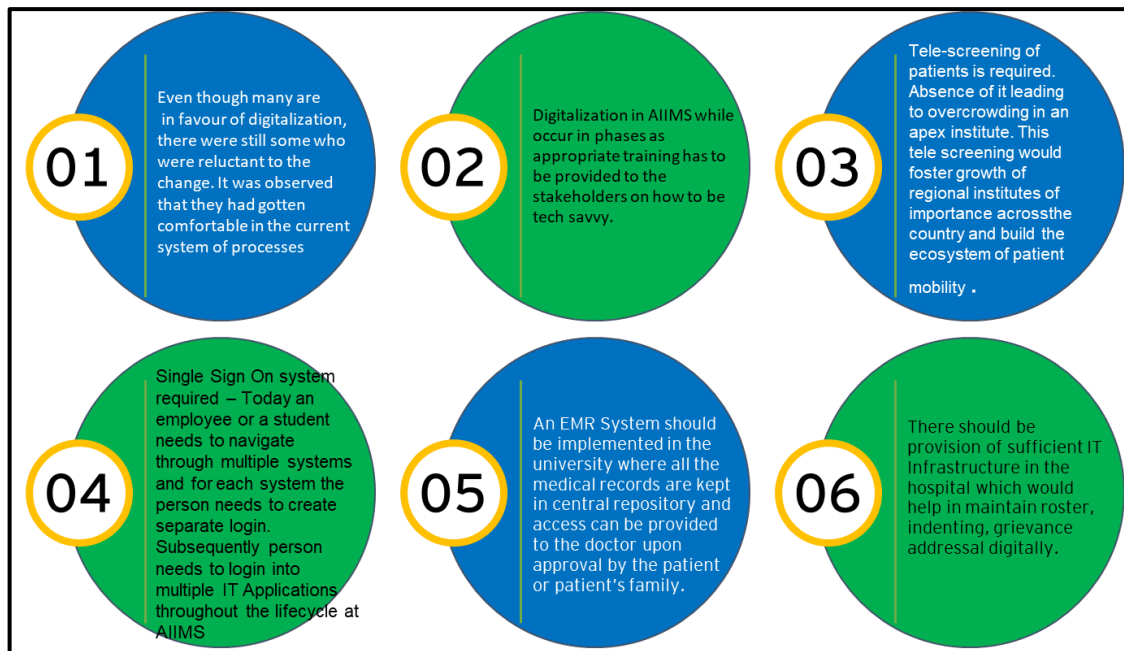
Nursing Officer:

- ► Because of having administrative duties, the nurses had to take time away from patient care. Research showed that the NIS could be a tool to support them in improving patient care, and medical documentation.[11]

- ► Increased patient loads, resulting in increased frequency of nursing tasks and non-nursing tasks, were positively correlated to incompletion of nursing activities during the shift. [12]

- ► The administrative duties, along with maintaining various manual registers increased the workload of the nurses. Research shows that Increased patient loads, resulting in increased frequency of nursing tasks and non-nursing tasks, were positively correlated to incompletion of nursing activities during the shift.[13]

Student:

1. Student web portal should be implemented. Using this portal students can place an online request for issuance of NOC and No due certificate. According to some research, adoption of student web portals brings upon the easier connection between the university and the student, thus growing an endless connection between them.[14]

2. It is difficult to maintain multiple IDs. A single sign on system should be implemented. Research showed that it allows students and faculty to log into their platform using their university credentials, without having to remember a unique set of credentials.[15]

2.4. Recommendation and Conclusion

Conclusion

01 Even though many are in favour of digitalization, there were still some who were reluctant to the change. It was observed that they had gotten comfortable in the current system of processes

02 Digitalization in AIIMS while occur in phases as appropriate training has to be provided to the stakeholders on how to be tech savvy.

03 Tele-screening of patients is required. Absence of it leading to overcrowding in an apex institute. This tele screening would foster growth of regional institutes of importance across the country and build the ecosystem of patient mobility.

04 Single Sign On system required – Today an employee or a student needs to navigate through multiple systems and for each system the person needs to create separate login. Subsequently person needs to login into multiple IT Applications throughout the lifecycle at AIIMS

05 An EMR System should be implemented in the university where all the medical records are kept in central repository and access can be provided to the doctor upon approval by the patient or patient's family.

06 There should be provision of sufficient IT infrastructure in the hospital which would help in maintain roster, indenting, grievance addressal digitally.

Recommendations:

1 Tele Screening and Tele Consultation

2 Queue Management System and Display board

3 Multiple SWEC Counters

4 Research Platform with data management tools

5 RFID Tagging for tracking patients.

6 Learning Management System.

7 Notification/Alert system

8 Digital applications and forms.

9 Online grievance and complaint system

3. References

1. The Impact of Digital Transformation in Healthcare [Internet]. LeewayHertz - Software Development Company. 2022 [cited 28 June 2022]. Available from: https://www.leewayhertz.com/digital-transformation-in-healthcare/
2. H, health H, Japan S, health F, scale-up T, Conference R. How to improve patient outcomes with digital health - [Internet]. Pharmaphorum.com. 2022 [cited 28 June 2022]. Available from: https://pharmaphorum.com/views-analysis-digital/how-to-improve-patient-outcomes-with-digital-health/
3. AIIMS - All India Institute Of Medical Science [Internet]. Aiims.edu. 2022 [cited 28 June 2022]. Available from: https://www.aiims.edu/en.html
4. The Impact of Digital Technology on Healthcare [Internet]. HealthManagement. 2022 [cited 28 June 2022]. Available from: https://healthmanagement.org/c/cardio/news/the-impact-of-digital-technology-on-healthcare
5. 5 Ways to Use Tech and Digital in Medical Education | Technivorz [Internet]. Technivorz. 2022 [cited 28 June 2022]. Available from: https://technivorz.com/5-ways-to-use-tech-and-digital-in-medical-education/
6. 8 Digital Health Technologies Transforming The Future Of Nurses - The Medical Futurist [Internet]. The Medical Futurist. 2022 [cited 28 June 2022]. Available from: https://medicalfuturist.com/the-future-of-nurses-superheros-aided-by-technology/
7. Mishra SK. Hospital overcrowding. West J Med [Internet]. 2001 [cited 2022 Jun 28];174(3):170. Available from: http://dx.doi.org/10.1136/ewjm.174.3.170
8. A B, S J, N A. Effect of Queue Management System on Patient Satisfaction in Emergency Department; a Randomized Controlled Trial [Internet]. PubMed. 2022 [cited 28 June 2022]. Available from: https://pubmed.ncbi.nlm.nih.gov/34580657/
9. T B, M H, SR N, M S, M G. Optimized Patients' Length of Hospital Stay with Interventions Based on Health Information Technology: A Review Study [Internet]. PubMed. 2022 [cited 28 June 2022]. Available from: https://pubmed.ncbi.nlm.nih.gov/32578544/
10. King J, Patel V, Jamoom EW, Furukawa MF. Clinical benefits of electronic health record use: national findings. Health Serv Res [Internet]. 2014 [cited 2022 Jun 28];49(1 Pt 2):392–404. Available from: http://dx.doi.org/10.1111/1475-6773.12135
11. King J, Patel V, Jamoom EW, Furukawa MF. Clinical benefits of electronic health record use: national findings. Health Serv Res [Internet]. 2014 [cited 2022 Jun 28];49(1 Pt 2):392–404. Available from: http://dx.doi.org/10.1111/1475-6773.12135
12. Sinha RK, Joy J. Nurses' knowledge of and attitude to nursing information systems. Br J Nurs [Internet]. 2022 [cited 2022 Jun 28];31(12):648–54. Available from: https://pubmed.ncbi.nlm.nih.gov/35736843/

13. Al-Kandari F, Thomas D. Factors contributing to nursing task incompletion as perceived by nurses working in Kuwait general hospitals. J Clin Nurs [Internet]. 2009 [cited 2022 Jun 28];18(24):3430–40. Available from: https://pubmed.ncbi.nlm.nih.gov/19538555/

14. Aden AM. Effectiveness of student portals in private universities, a case study of mount Kenya university. Halfwave Studios [Internet]. 2019 [cited 2022 Jun 28]; Available from: https://www.academia.edu/39767212/EFFECTIVENESS_OF_STUDENT_POR TALS_IN_PRIVATE_UNIVERSITIES_A_CASE_STUDY_OF_MOUNT_KENYA _UNIVERSITY

15. Functional objectives of single sign on (SSO) and student information system (SIS) [Internet]. Gouconnect.com. [cited 2022 Jun 28]. Available from: https://support.gouconnect.com/en/articles/4169345-functional-objectives-of-single-sign-on-sso-and-student-information-system-sis
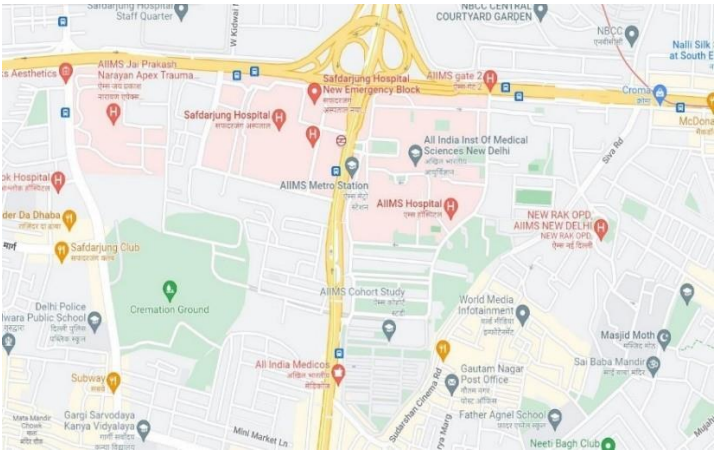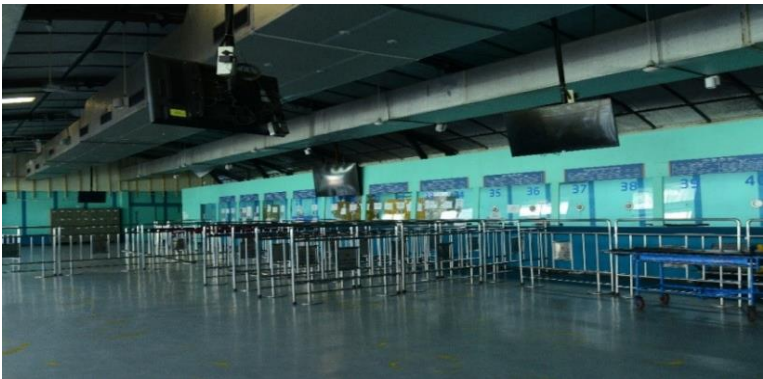
4. Annexure

► Time Schedule

Some of the departments I had visited during my time at EY include:

S.No	Name of the Department	Date(s) of Visit	TimeSpent
1	Centre of dental education and research	21st April	4 hours
2	Nursing Department	19th April	5 Hours
3	Dermatology	20th April	3 Hours
4	Nursing Department	21st April	2 Hours
5	Gynecology	29th April	1 hour
6	Neurosurgery	6th May	2 hours

7	ENT Orthopaedic Gstroenterology	7th May	5 hours
8	Research Section	24th May	1 hour
9	Neuroanaesthesiology	26th May	1 hour
10	Research Section	27th May	1 hour
11	CNC Blood Bank Neurobiochemistry Neuropathology Neuroradiology	27th May	1 hour
12	Plastic, Reconstructive and Burns Surgery	28th May	1 hour
13	Research Section	30th May	2 hours
14	Orthopaedic	31st May	1 hour
15	Medical Record Department	2nd June	2 hours
16	PMR	2nd June	1 hour
17	AIIMS PMU Team	3rd June	1 hour
18	Plastic, Reconstructive and Burns Surgery	7th June	1 hour
19	Plastic, Reconstructive and Burns Surgery	13th June	1 hour
20	Neurosciences HIC	15th June	½ hour
21	Endocrinology	16th June	½ hour
22	Psychiatry	16th June	1 hour
23	Geriartic Medicine	17th June	1 hour
24	PMR	17th June	1 hour
25	Geriartic Medicine	20th June	1 hour

► Data collection format, tables, pictures and charts.

AIIMS Map	
Registration Counter	
Patients in waiting area	

| Taking feedback from students | |

EY Team	

Questionnaire Prepared for Survey change the tool

Patient:

1. Are you a new patient or referral patient?
    a. New Patient
    b. Referral Patient
2. How did you take your appointment?
    a. Online Website
    b. Walk in
3. How much time did it take to meet the doctor?
    a. 0-30 mins
    b. 31 min-1 hour
    c. 1 hour-2 hour
    d. More than 2 hours
4. How much time did it take for completing the registration?

Likert scale 1-5

Shortest time 10 minutes

Longest time >3 hours

5. How did you pay the bill?

    a. Cash

    b. Card

6. How Satisfied are you? 1-Dissatisfied 2-Satisfied

Opd registration

Billing

Investigation

Waiting time

7. What is your feedback on the current system?

Faculty:

1. How long have you been working for AIIMS?

    a. 0-5 years

    b. 5-10 years

    c. 11-15 years

    d. 15+ years

2. How much time do you spend in various activities?

Likert Scale - 10% 20% 30%

    a. Patient care

    b. Academic

    c. Research

    d. Administrative

3. How many modules are you aware about in e Hospital?

    a. 1-3

    b. 4-6

    c. 7-10

    d. <10

4. How easy is to access the modules in eHospital?

    Likert scale 1-5 (1 Difficult 5 easy)

5. Do you use other application at individual level?

    a. Yes

     b. No

6. What is your feedback on current IT System?

Nursing Officer:

1. How long have you been working for AIIMS?
   a. 0-5 years
   b. 5-10 years
   c. 10-15 years
   d. 15+ years
2. How much time to do you spend in daily activities?

   Likert scale from 10 to 60%
   a. Patient Care
   b. Administrative
   c. Others
3. How much time would you be able to spend on patient care if IT System is customised according to your need?
   a. <10%
   b. 10-30%
   c. 30-50%
   d. 50-70%
   e. 70-100%
4. How easy is to access the modules in eHospital?

   Likert scale 1-5 (1 Difficult 5 easy)
5. How many modules are you aware about in e Hospital?
   e. 1-3
   f. 4-6
   g. 7-10
   h. <10
6. How many modules do you use in e Hospital?
   i. 1-3
   j. 4-6
   k. 7-10
   l. <10

7. What is your feedback on current IT System?

8. What features do you want in the IT System?

Student:

1. Are you a?
    a. UG Student
    b. PG Student
    c. Post PG Student

2. How easy it is to get IDs in the institution?
   Likert scale from 1-5 (1-very difficult 5- easy)

3. How satisfied are you with application of SARAL learning management system?
   Likert scale from 1-5 (1-difficult to use 5- easy to use)

4. How easy it is to get NOC?
   Likert scale from 1-5 (1-very difficult 5- easy)

5. What do you want in the learning management system? (click as many options you want)
    a. Leave management system
    b. Academic schedule
    c. Notification system
    d. Monitoring of research project
    e. View patient management schedule
    f. Digital payment
    g. Other:

6. What is your feedback on the current IT System?