

**CHALLENGES AND OPPORTUNITY OF ELECTRONIC MEDICAL
RECORD SYSTEM (EMR) IN BANGLADESH**

BY

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Master of Science in Computer Science and Engineering

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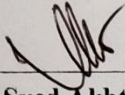


**DAFFODIL INTERNATIONAL UNIVERSITY
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APPROVAL

This Thesis titled “**Challenges and Opportunity of Electronic Medical Record System (EMR) In Bangladesh**”, submitted by **A. H. M. Mojaddeque Karim**, ID No: **143-25-435** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of M.Sc in Computer Science and Engineering and approved as to its style and contents.

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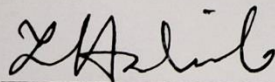


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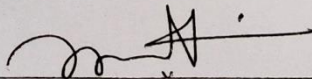


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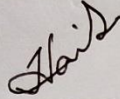
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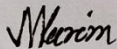
I hereby declare that, this thesis has been done by me under the supervision of **Dr. Sheak Rashed Haider Noori, Assistant Professor, Department of CSE, Daffodil International University**. I also declare that neither this thesis nor any part of this thesis has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

To broadly examine the Opportunities and Challenges of electronic medical record system in Bangladesh. There have lots of opportunities and challenges to implement the EMR system. Also, there have potential health benefits of health information system (HIS), this paper identified the challenges and helped the authority to considering those challenges as well as opportunities during the implementation of EMR system in Bangladesh. Also compares health care with the use of IT in other industries. It estimates potential savings and costs of widespread adoption of electronic medical record (EMR) systems, model's important health and safety benefits, and concludes that effective EMR implementation and networking could eventually save more money by improving health care system efficiency and that savings while increasing health and other social benefits. However, this is unlikely to be realized without related changes to the electronic medical record system.

The developing world faces a series of health care crises that threaten the lives of millions of people. Lack of infrastructure and trained, experienced staff are considered important barriers to scaling up treatment for these diseases. In this paper we explain why electronic Medical Record (EMR) system are important in many healthcare projects in the developing world. We discuss pilot projects demonstrating that such systems are possible and can expand to manage hundreds of thousands of patients.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The rise in diseases, demand for quality care by patients and the increasing number of hospitals and clinics are paving the way for the overall growth of the global electronic medical record technology. The advent of integrated healthcare services delivery platform with the help of EMR technology has led to the wide popularity of EMR software among hospitals and clinics.

Bangladesh is the eighth most populous nation in the world, with a democratic government at its helm. The country is seen as extremely poor and under-developed, due to devastating natural disasters, and the socio-political instability.

The Bangladesh government is actively seeking foreign investment, particularly in areas of health sector. Bangladesh government understand that need to develop in quality of services in health sector. And implementation of EMR can be the more effective way to develop in this field.

1.2 Motivation

My previous and current job motivated me to do this type of thesis. Recently high court of has declared that prescription should be clear so that patient can read their prescription. Through my research I can help authority to implement EMR system in Bangladesh. I have a contribution in implementing EMR system all over the selected hospitals in Bangladesh. Bangladesh government taken initiatives as well as implemented EMR system in 12 government hospitals and I worked there as a project manager and motivated me to make a thesis on EMR system in Bangladesh. My thesis can help the authority to take decision to identify the opportunities and challenges in implementing EMR system in Bangladesh. Thus motivated me to do thesis on it.

1.3 Rationale of the Study

There have lots of challenges and opportunities to implement the EMR system. If it can be distinguishable and probable solution is fixed beforehand then the implementation

of EMR system may smooth operation. On the other hand, there have huge opportunities in EMR system. If those pros and cons is well known to the authority, then the authority easily manage donor fund to implement the EMR system so that people will be beneficiate.

1.4 Research Questions

There have lots of questions regarding this topic but selected one of them for my research. Does EMR System improve quality of Patient care Service in Bangladesh and Is there any opportunities and implementation challenges?

1.5 Expected Output

Automation system is meant to make life easier for the service recipients as well as service providers. However, from the research we expect to find out the challenges to implement automation system. Also, more services provided by the same number of service providers within the same amount of time and resources and the transparency and accountability of the provider and organization is increased. Ultimately, the patients are happier than former system.

CHAPTER 2

BACKGROUND

2.1 Introduction

Bangladesh is a most densely populated country and there have lots of problems, but Bangladesh government want to ensure better health services of every people. Bangladesh government has set a goal and running towards the goal. Also, they have declared to establish digitalization in every sector. Already government achieves renown in health sector. Recently many foreign health delegates came in our country to observe the improvement as well as achievements of health sector. In this regard they have taken initiatives to rollout automation project all over the country. As this is costly projects government seeking vendors to implement automation system step by step. Primarily government piloted automation in 10 hospitals and I worked there as a project manager. Although there have lots of challenges in the meantime there have opportunities.

2.2 Related Works

Recently GIZ have published an article on digitalization in Bangladesh in German magazine. They have highlighted how the patients are getting benefits by implementing EMR system in Bangladesh. In the meantime, facility provider also happy to give more time to the service receiver. They have visited Sarkary Karmachari Hospital (SKH) in Dhaka, Bangladesh.

2.3 Research Summary

Under the supervision of Management Information System (MIS) of Directorate General of Health Services under Ministry of Health and Family Welfare (MoHFW) started the automation in 10 tertiary level hospitals using OpenMRS^[1] and PACS software. Although this is not fully functioning but maximum covering health services area. And I was managing that projects. A community-based software development entity, namely HISP India got the opportunity to plan, design and develop this software and One private company got the work to implement this software. After the project implementation and a year after, I started to conduct this research. My primary

audiences were the patients and the system users. A 120-patient sample was chosen randomly, as they visit the hospital, of which 60 male and 60 females for quantitative study. I also chose six doctors, two pharmacist, four registration clerks, four nurses, one laboratory technician, two inventory User, two billing clerk one Radiologist and one statistician for the qualitative study of the research.

2.4 Scope of the Work

I set my research scope on an automation system or electronic medical record (EMR) system. The hospital name is Sarkari Karmachari Hospital (SKH) under MOPA, NICVD^[8], NITOR, NIKDU, MFSTC, MCHTI in Dhaka,

2.5 Challenges

To implement the EMR system need to consider the following challenges. In our country power and internet is the main barrier to implement the EMR system. Depending on the time of the year, the availability of electricity varies. In many cases, the electricity is not available whole the out-patient service time. It really hampers the system to operate to the mark.

- Consistent Power Supply
- Power Backup
- Consistent Internet connectivity for real time data synchronization
- User adaptability to the computer & HMS system
- Preparation of Stock list /drug/Master data setup (doctors/client)
- Readiness of Infrastructure
- Local Administrator and ICT Support
- Logistics support
- Change Management
- Queue Management

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Subject and Instrumentation

Does EMR System improve quality of Patient care Service in Bangladesh and Is there any challenges and opportunities?

- Supports International Classification of Diseases (ICD-10)
- Supports Systematized Nomenclature of Medicine-Clinical Terms (SNOMED-CT)
- Supports Logical Observation Identifiers Names and Codes (LOINC^[4])

There are 10 modules running in different government hospital primarily

- Hospitalcore
- Registration
- OPD
- IPD
- Billing
- Inventory
- Laboratory
- Radiology
- Report
- DMS
- PACS

Registration Module:

Patients are registering through this module and getting one patient ID. Using this ID patients are getting all services and all the clinical data are storing through this ID. During 2nd visit or third visit or in any visit doctors can find that patient as well as his all clinical records.

Patient Registration Form Mr. Super | Today Registration : 0

Name * [Advance search](#) **ID Number *** SKH181128113401012-8

Demographics * dd/mm/yyyy
 Age Birthdate: Gender:

Patient category
 Government Non Government Dependent
 Freedom fighter Temporary Others

Address Postal Address:
 District:
 Upazila:

Working Place:
Designation:
National ID:
Birth Certificate ID:

Phone number

Relative Name *

Referral Information
 Referred
OPD Room to Visit: *

Fields marked with * are mandatory!

Figure 1: Registration Interface

After registration Patient are getting services in one patient ID:

 **Sarkari Karmachari Hospital**
 Fulbaria, Dhaka-1000



Patient ID. : SKH17213113423993-7
Patient Name : A H M Mojaddeque Karim
Age : 34y 4m 25d, ADULT
Gender : Male
Category : **Non Government**
Son of : Ibrahim Hossain
Phone Number : 01716857070
Postal Address : H-24, R-2, Shekhertek
District : Dhaka District
Upazila : Adabor Thana
OPD room to visit : **NEW BUILDING (EMERGENCY)**
Date/Time : Sat 24/11/2018 15:23
Registration Fee : TK 10

বিঃদ্রঃ নিবন্ধন কাগজটি পরবর্তী ভিজিটের জন্য অবশ্যই সংরক্ষণে রাখুন

Figure 1.1: Complete Registration

OPD (Prescription)

Doctors are prescribing through this module. Can view the clinical records of old patients. Can view laboratory, Pharmacy, Radiology and IPD records

#	Patient id	Patient name	Age	Gender	Referral type	Status	Visit Time
1	SKH17213113423993-7	A H M Mojadduque Karim	34y 4m 25d	M	REVISIT		2018-11-24 15:23:16.0
2	SKH18112432625374-8	Shimul	34y 0m 0d	M	New Patient		2018-11-24 15:27:23.0

Figure 1.2: Patient Queue and Prescription Form

OPD (Clinical History)

Doctor can view clinical history of a patient. Older prescriptions in date wise.

Patient ID: SKH179231132215373-8		Age: 33y 2m 1d		Location: 103-NEW BUILDING (R/S)			
Name: Abdullah Al Mamun		Referral: REVISIT		Gender: M			
Patient Category: Adult				Patient Category: Government			
IPD entry	Clinical summary	Laboratory record	Radiology record	IPD record	Pharmacy record		
View	Date of visit	Treating doctor	Diagnosis	Drug Given	Investigation	Visit Outcome	Action
Detail	17/10/2017	Dr. A.H.M. Tanvir Hasan Jr. Consultant Orthopedic	ARTHRITIS, N/A FOR PATIENT	# ACECLOFENAC - Tablet 100mg - 3+0+3 - 75/HR # OMEPRAZOLE - Capsule 20mg - 3+0+3 - 10/HR	CRP (C-REACTIVE PROTEIN), LEFT HAND B/V, S. URIC ACID, COMPLETE BLOOD COUNT (MANUAL)	reviewed	View Prescription
Detail	17/10/2017	Dr. Mohammad Osman Medical Officer	N/A FOR PATIENT			follow	View Prescription
Detail	23/09/2017	Dr. Mohammad Osman Medical Officer	N/A FOR PATIENT	# ACECLOFENAC - Tablet 100mg - 3+0+3 - 5/HR # OMEPRAZOLE - Capsule 20mg - 3+0+3 - 10/HR	LEFT WRIST JOINT B/V	follow	View Prescription

Figure 1.3: Patient Clinical History

IPD:

This is the IPD record. Whatever doctor prescribed for the admitted patient nurses can see and provide medicines to the patients. Authority can see the bed status which beds are empty or occupied.

Patient Name: Md Forhad Sikder		Patient ID: SKH1762106508890-4		Age: 23y 5m 7d		Gender: M									
Relative Name: Md Julfikar Uddin						Bed Number: 2									
Admitted Ward: ICU															
Address: Adabor Thana Dhaka District															
No	Date/Time	Temp	P/R(/min)	R/R(/min)	B/P	SPO2	Urine Sugar	Urine Albumin	Reflow	Weight	Abd.Girth	Dressing	Bowel Sound	Dehydration	Diet
	2018-11-28 11:46:39														

#	Admission date	Patient ID	Patient Name	Age	Gender	Admission Ward	Bed Number	Under Doctor/Observation	Action
1	26/07/2017	SKH1762106508890-4	Md Forhad Sikder	23y 5m 7d	M	ICU	2	Dr. Md. Shahabul Huda Chowdhury Sr. Consultant Medicine	Treatment Intake & Output ENT Daily Follow Up Prescription Diabetic Chart Gyna-Vital-Statistic Baby Follow-up Sleep Follow-up Eye Vital Stat. Transfer Discharge Exit
2	26/07/2017	SKH16820930318915-0	Mrs Nazma Begum	50y 3m 3d	F	GYNAE AND OBS WARD	32	Dr. Arifa Zaher Jr. Consultant Gynae	Treatment Intake & Output ENT Daily Follow Up Prescription Diabetic Chart Gyna-Vital-Statistic Baby Follow-up Sleep Follow-up Eye Vital Stat. Transfer Discharge Exit
3	26/07/2017	SKH17520111857935-4	Trina Das	25y 3m 30d	F	GYNAE AND OBS WARD	31	Dr. Sumana Rahman Jr. Consultant Gynae	Treatment Intake & Output ENT Daily Follow Up Prescription Diabetic Chart Gyna-Vital-Statistic Baby Follow-up Sleep Follow-up Eye Vital Stat. Transfer Discharge Exit

Figure 1.4: Admitted Patient Data

Laboratory Orders and Report

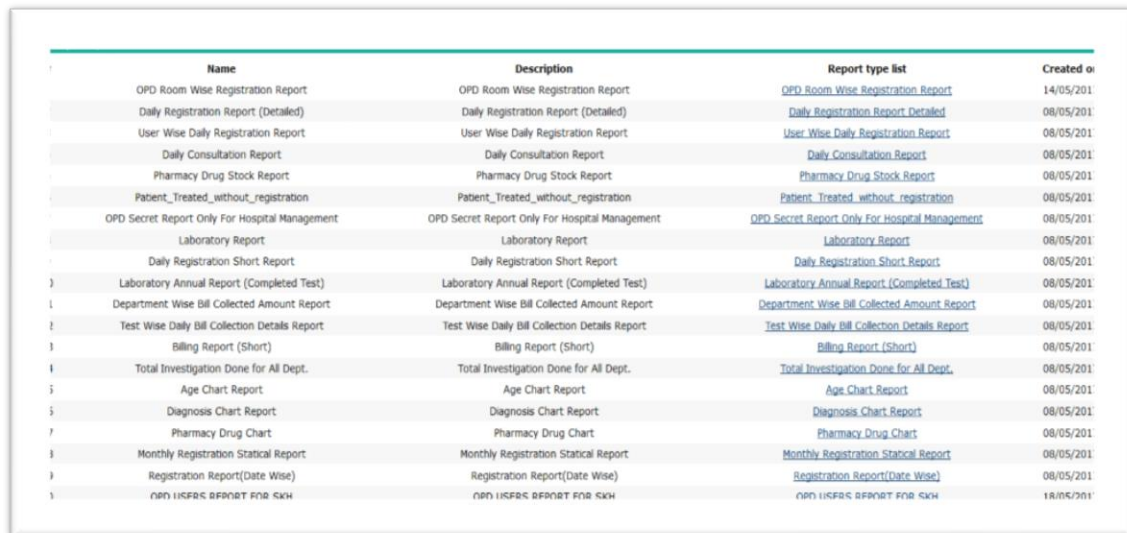
Doctors can view laboratory records easily and can prescribe patient instantly. Doctor can see also patient's disease pattern.

Patient ID: SKH179141151474109-1		Location: 103-NEW BUILDING (R/S)	
Name: Rumi		Age: 16y 2m 10d	
Age category: Adolescent		Referral: REVISIT	
		Gender: F	
		Patient Category: Dependent	
OPD entry	Clinical summary	Laboratory record	Radiology record
		IPD record	Pharmacy record
DEPARTMENT OF BIOCHEMISTRY			
S. ALT (SGPT)			
		S. ALT (SGPT)	
14-Sep-2017 13:22:36	224 U/L		
S. BILIRUBIN			
		S. BILIRUBIN	
14-Sep-2017 13:22:45	0.8 mg/dl		
S. CREATININE			
		S. CREATININE	
14-Sep-2017 13:22:22	0.8 mg/dl		
14-Sep-2017 13:22:17	0.8 mg/dl		
DEPARTMENT OF MICROBIOLOGY			
Blood Group With Rh Factor			
Blood Group With Rh Factor			

Figure 1.5: Lab Report

Reports:

Hospital authority can view all the reports any time and can take realistic decision. There has a dashboard for the authority to observe the present situation of his hospital. This can help the authority during demanding budgeting.



Name	Description	Report type list	Created on
OPD Room Wise Registration Report	OPD Room Wise Registration Report	OPD Room Wise Registration Report	14/05/201
Daily Registration Report (Detailed)	Daily Registration Report (Detailed)	Daily Registration Report Detailed	08/05/201
User Wise Daily Registration Report	User Wise Daily Registration Report	User Wise Daily Registration Report	08/05/201
Daily Consultation Report	Daily Consultation Report	Daily Consultation Report	08/05/201
Pharmacy Drug Stock Report	Pharmacy Drug Stock Report	Pharmacy Drug Stock Report	08/05/201
Patient_Treated_without_registration	Patient_Treated_without_registration	Patient_Treated_without_registration	08/05/201
OPD Secret Report Only For Hospital Management	OPD Secret Report Only For Hospital Management	OPD Secret Report Only For Hospital Management	08/05/201
Laboratory Report	Laboratory Report	Laboratory Report	08/05/201
Daily Registration Short Report	Daily Registration Short Report	Daily Registration Short Report	08/05/201
Laboratory Annual Report (Completed Test)	Laboratory Annual Report (Completed Test)	Laboratory Annual Report (Completed Test)	08/05/201
Department Wise Bill Collected Amount Report	Department Wise Bill Collected Amount Report	Department Wise Bill Collected Amount Report	08/05/201
Test Wise Daily Bill Collection Details Report	Test Wise Daily Bill Collection Details Report	Test Wise Daily Bill Collection Details Report	08/05/201
Billing Report (Short)	Billing Report (Short)	Billing Report (Short)	08/05/201
Total Investigation Done for All Dept.	Total Investigation Done for All Dept.	Total Investigation Done for All Dept.	08/05/201
Age Chart Report	Age Chart Report	Age Chart Report	08/05/201
Diagnosis Chart Report	Diagnosis Chart Report	Diagnosis Chart Report	08/05/201
Pharmacy Drug Chart	Pharmacy Drug Chart	Pharmacy Drug Chart	08/05/201
Monthly Registration Statal Report	Monthly Registration Statal Report	Monthly Registration Statal Report	08/05/201
Registration Report(Date Wise)	Registration Report(Date Wise)	Registration Report(Date Wise)	08/05/201
non USF&S REPORT FOR SKH	non USF&S REPORT FOR SKH	non USF&S REPORT FOR SKH	14/05/201

Figure 1.6: Statistical Report List

3.2 Data Collection Procedure

Data Collections

- Service Delivery and Patient Satisfactory Survey
- User Satisfaction Survey
- Samples were selected onsite as patients visited hospital
- Qualitative data collected through one to one conversation

Data Analysis

- Gender-based analysis
- Age-based analysis
- Hospital based survey (Facilities, Infrastructure and Others)
-

Qualitative Study

- Focused Group Discussion (FGD) with Patients
 - 2 FGDs were done
- IDI with the digital system users
 - 4 IDIs were done

3.3 Implementation Requirements

- Recruit your implementation committee from stakeholder groups
- Outline your expected implementation costs and define the total budget
- Schedule your implementation (best done after your roadmap is complete)
- Migration of patient and practice data
- Create a user training program
- Clearly define go-live activities
- Define critical success factors and evaluation strategies

CHAPTER 4

EXPERIMENTAL RESULTS AND DISCUSSION

4.1 Experimental Results

- Results exceeded the expectation
- In a year, patient increased from 450 to 650 daily
- Improved Medical services
- Decision making improved drastically

Having said that, a well-defined budget featuring the following elements should ensure no unexpected costs come out of the woodwork:

- Hardware and network upgrades
- Customization consultancy from the EMR vendor
- Vendor training fees
- Consultancy costs
- Data backups and storage

Through the following questionnaires' Got the following scenarios

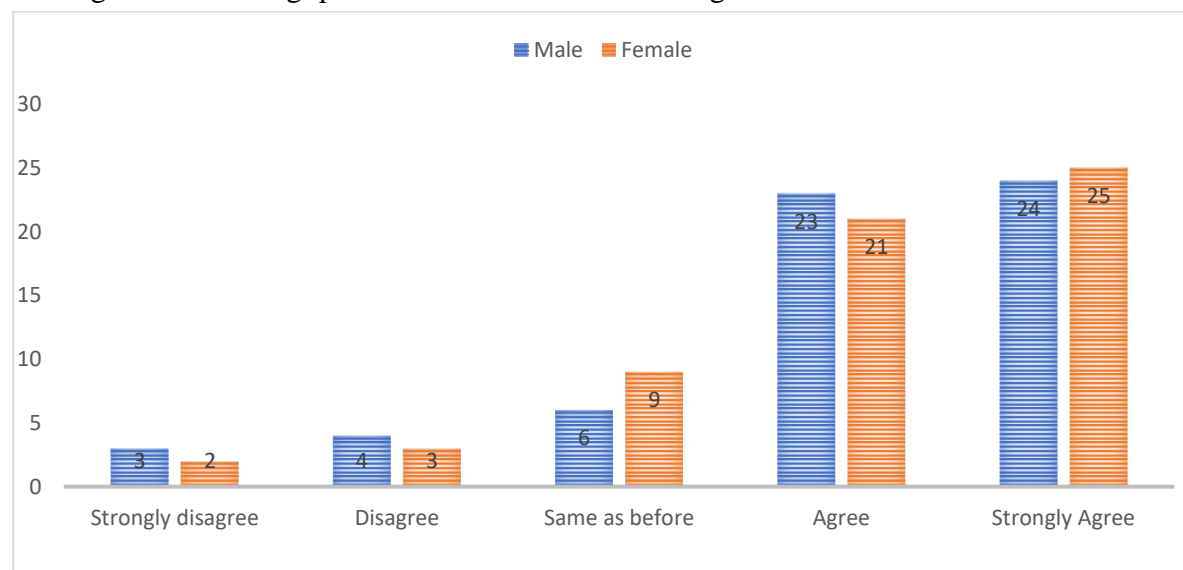


Figure 4.1: Result of Question-1: Automation system reduced the registration hassle.

In the above figure of question one, 24 male and 25 female patients strongly agreed, 23 male and 21 female patients agreed, 6 male and 9 female patients same as before, 4 male and 3 females disagree, 3 male and 2 female patients out of 120 patients strongly disagree that automation system reduced the registration hassle.

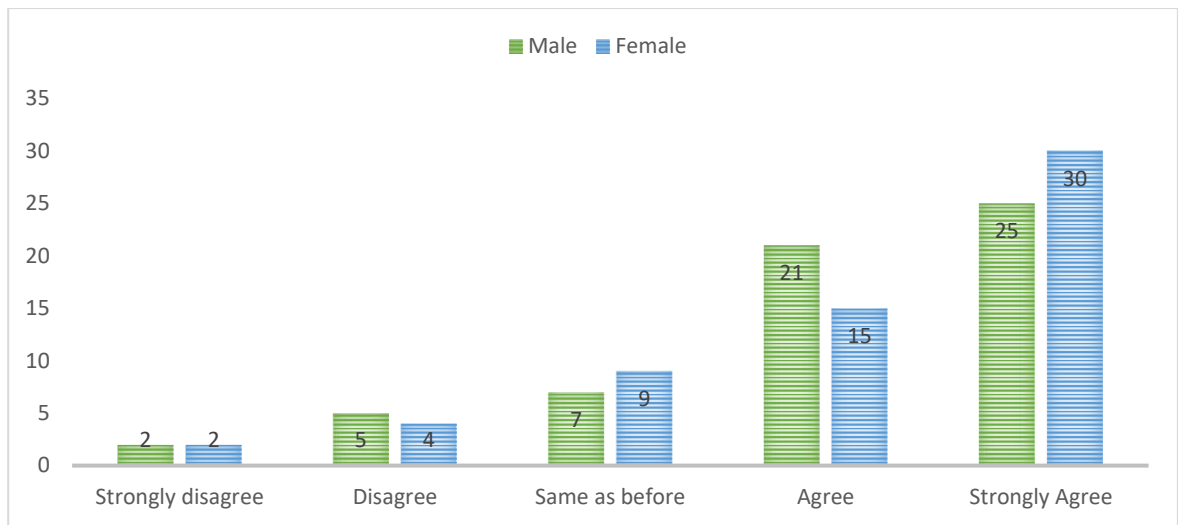


Figure 4.2: Result of Question-2: It is not necessary to bring all previous medical records now.

In the above figure of question Two, 25 male and 30 female patients strongly agreed, 21 male and 15 female patients agreed, 7 male and 9 female patients same as before, 5 male and 4 females disagree, 2 male and 2 female patients out of 120 patients strongly disagree that not necessary to bring the patient's medical records.

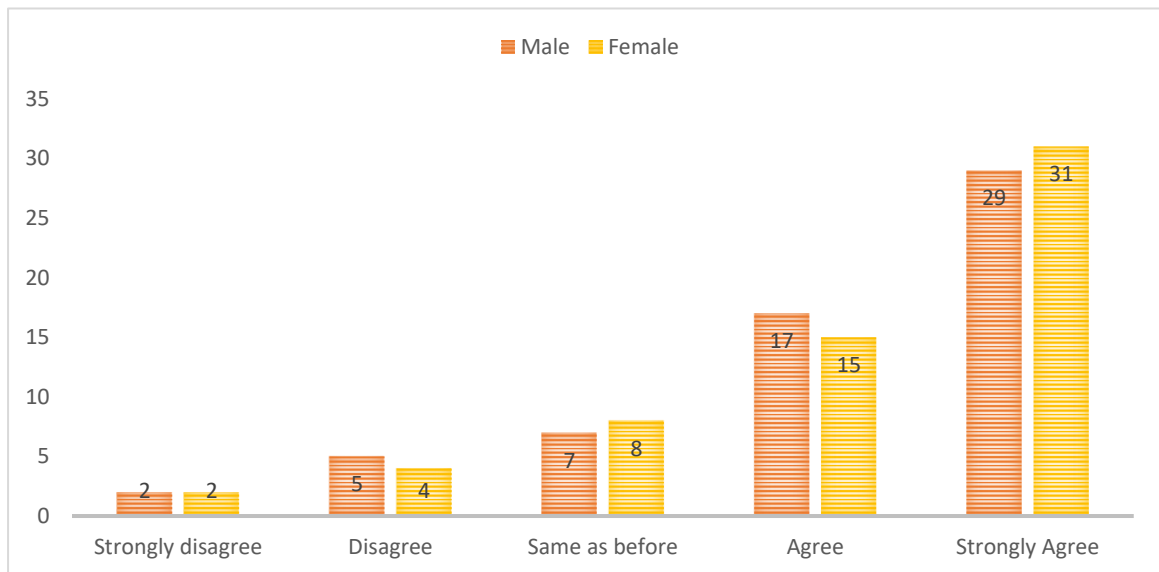


Figure 4.3: Result of Question-3: Medical services have got speed due to the digitalization.

In the above figure of question Three, 29 male and 31 female patients strongly agreed, 17 male and 15 female patients agreed, 7 male and 8 female patients same as before, 5 male and 4 females disagree, 2 male and 2 female patients out of 120 patients strongly disagree that medical services have got speed due to the digitalization.

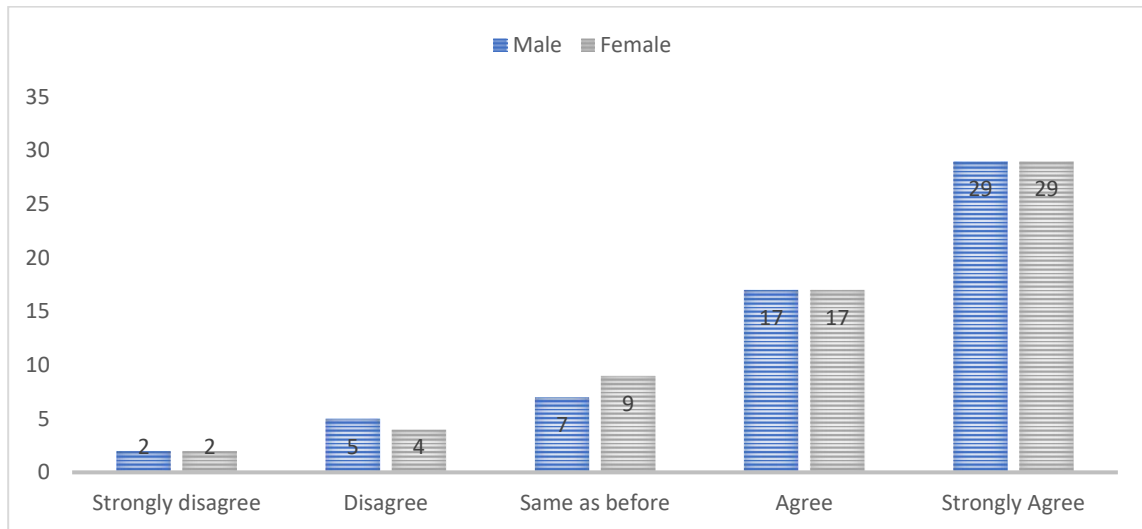


Figure 4.4: Result of Question-4: Due to digital system harassment by the broker has been stopped.

In the above figure of question Three, 29 male and 29 female patients strongly agreed, 17 male and 17 female patients agreed, 7 male and 9 female patients same as before, 5 male and 4 females disagree, 2 male and 2 female patients out of 120 patients strongly disagree that due to digitalization system harassment by the broker has been stopped.

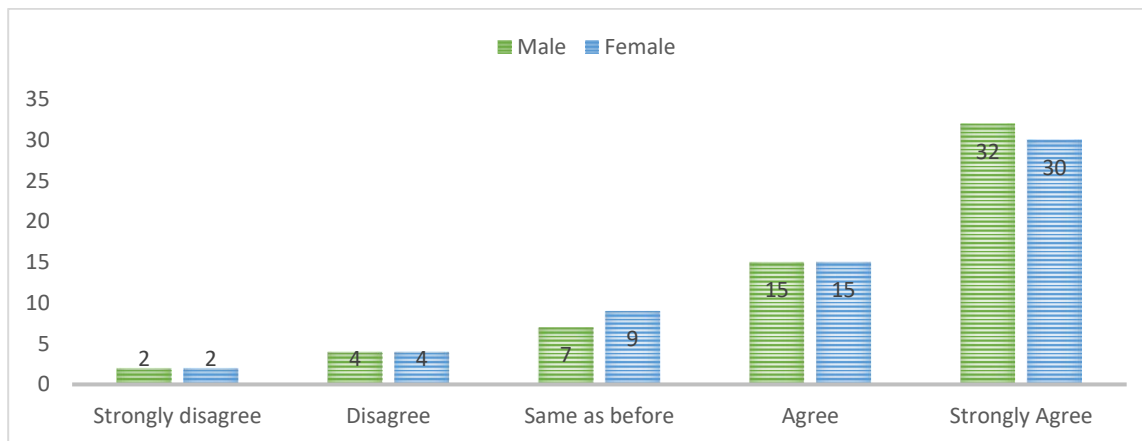


Figure 4.5: Result of Question-5: Indiscipline, corruption has been reduced in patient admission, test and billing due to digitalization.

In the above figure of question Three, 32 male and 30 female patients strongly agreed, 15 male and 15 female patients agreed, 7 male and 9 female patients same as before, 4 male and 4 females disagree, 2 male and 2 female patients out of 120 patients strongly disagree that due to digitalization system harassment by the broker has been stopped.

disagree that indiscipline, corruption has been reduced in patient admission, test and billing due to digitalization.

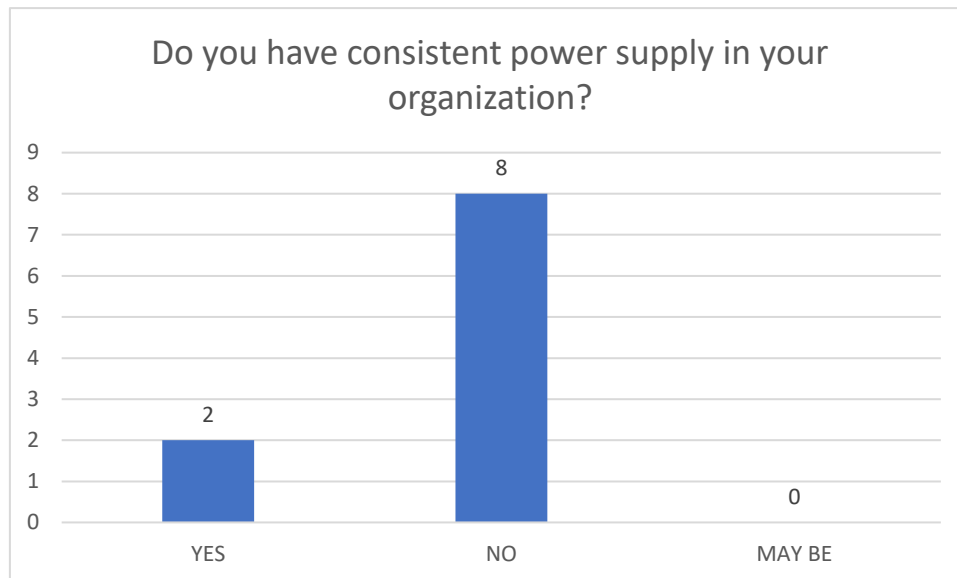


Figure 4.6: Result of Question-1(Survey-2)

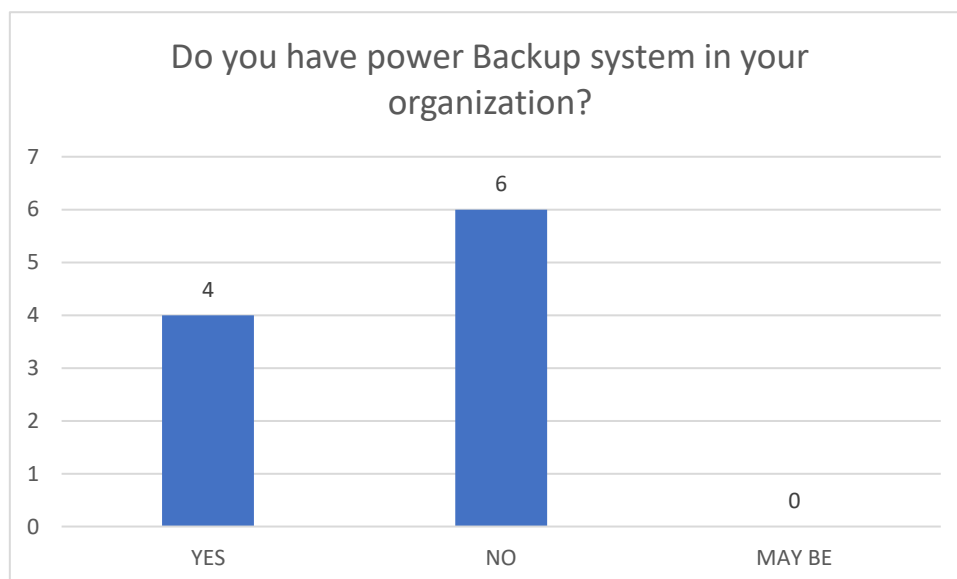


Figure 4.7: Result of Question-2 (Survey-2)

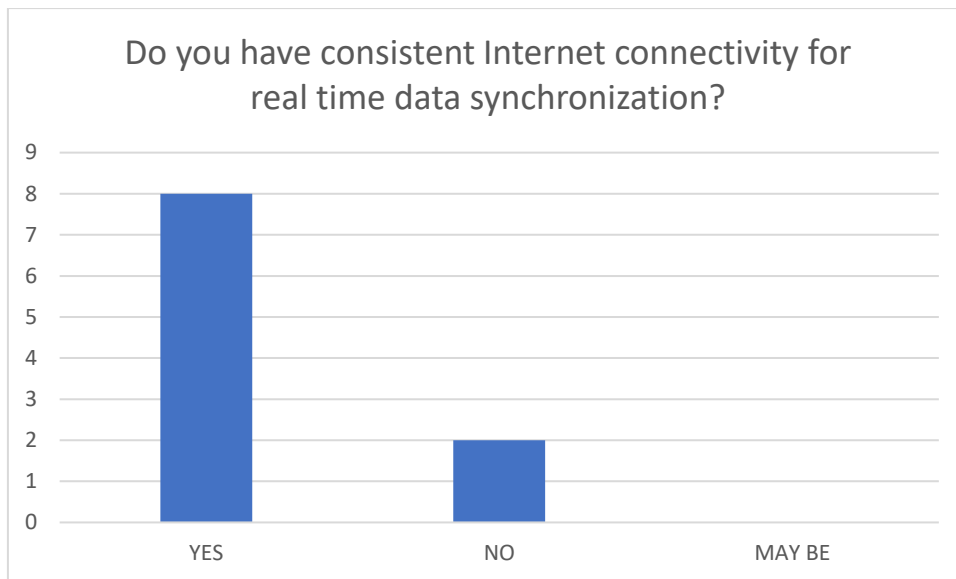


Figure 4.8: Result of Question-3 (Survey-2)

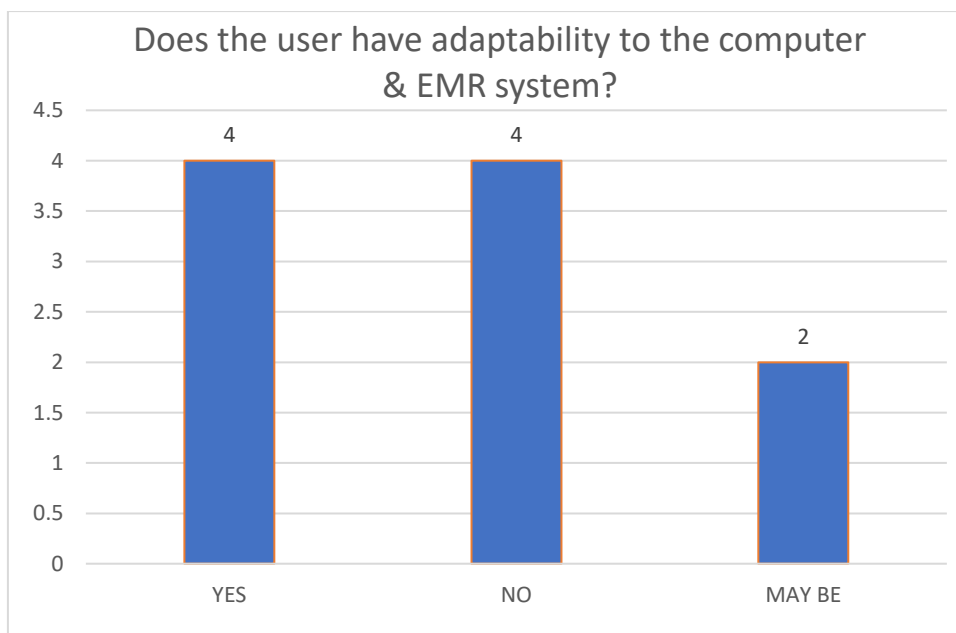


Figure 4.9: Result of Question-4 (Survey-2)

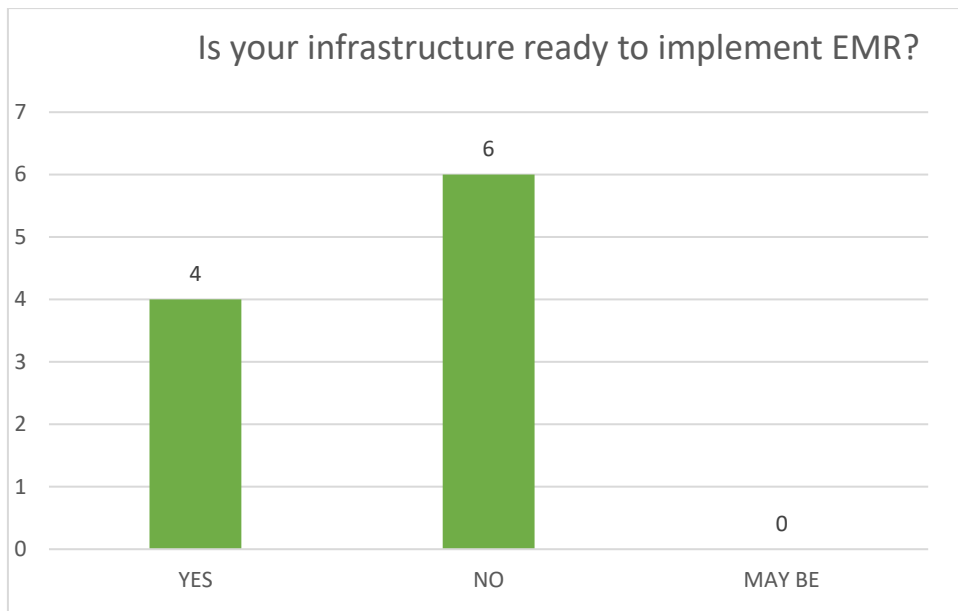


Figure 4.10: Result of Question-5 (Survey-2)

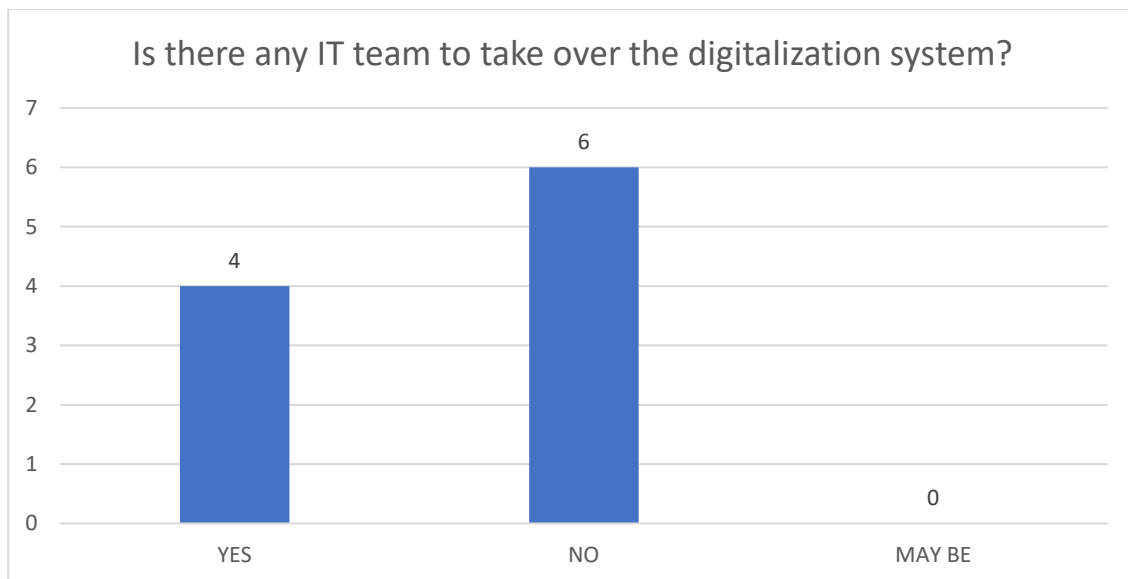


Figure 4.11: Result of Question-6 (Survey-2)

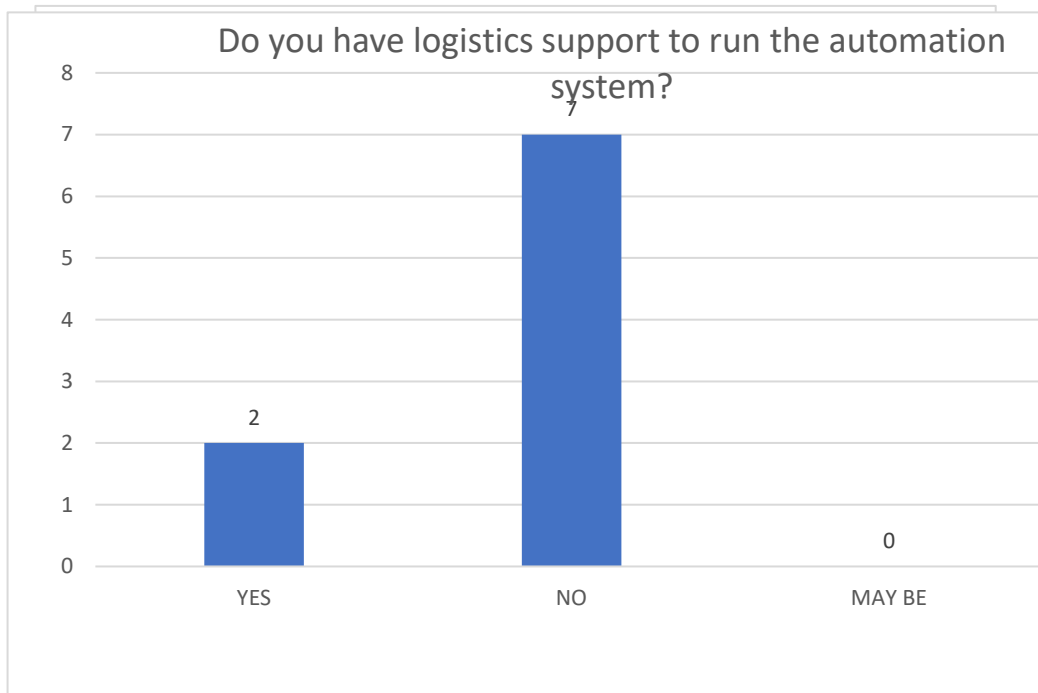


Figure 4.12: Result of Question-7 (Survey-2)

The table is showing the status of different hospital EMR system (module wise) means department wise EMR implementation.

Projects	Name of Running Module	Status	Comments
NIKDU	Registration	User is giving entry 100%, generating report and collecting registration fee smoothly	
	Billing	Collecting bill form patients, generating report and submitting accounts to the accountant	Collecting bill auto and Manual system parallel due to audit problem.
	OPD	Doctors keeping the record of patients.	All doctors does not use this software.

Projects	Name of Running Module	Status	Comments
			Need proper monitoring from higher authority.
	IPD	Admission process is continuing by RP/RS	Need to do discharge also. Our supporting stuff is doing this job.
	Laboratory	Not using. They need change in software process.	System is ready
	Radiology	PACS is ready for x-ray only.	USG machine is not updated. Need another software. X-Ray machine damages.
	Inventory	Not using	Users is not providing stock information.
	Report	100% working	
NICVD	Registration	User is giving entry 100%, generating report and collecting registration fee smoothly	
	Billing	Collecting bill form patients, generating report and submitting accounts to the accountant	Biochemistry, Emergency, Pathology, Microbiology, and

Projects	Name of Running Module	Status	Comments
			Radiology, Cardiology department and rent collection means all department are collecting their bills through software.
	OPD	Not using	System is ready. Authority want to start all the modules step by step.
	IPD	Not using	System is ready. Authority want to start all the modules step by step.
	Laboratory	Functioning in practice mode	All the departments are preparing report through OpenMRS ^[1] software in practice purpose.
	Radiology	Will start soon	Template is preparing
	Inventory	Not using	Current balance of items/drugs inserting in system
	Report	100% working	Preparing as per needs.

Projects	Name of Running Module	Status	Comments
NITOR	Registration	User is giving entry 100%, generating report and collecting registration fee smoothly	
	Billing	Collecting bill form patients, generating report and submitting accounts to the accountant	
	OPD	Not Using. But setup computers on their desk	Now authority is interested to start this module soon.
	IPD	Not Using	System is ready
	Laboratory	Not Using	System is ready
	Radiology	Not Using	System is ready
	Inventory	Not Using	System is ready
	Report	100% working	Preparing as per needs.
SKH^[7]	Registration	User is giving entry 100%, generating report and collecting registration fee smoothly	
	Billing	Collecting bill form patients, generating report and submitting accounts to the accountant	

Projects	Name of Running Module	Status	Comments
	OPD	Doctors are treating patients through this software.	
	IPD	System is running there smoothly partially	
	Laboratory	System is running there smoothly	
	Radiology	System is ready. Soon they will start.	
	Inventory	Pharmacy department is issuing medicine to the patients through software.	
	Report	100% working	Preparing as per needs.
MFSTC	Registration	User is giving entry 100%, generating report and collecting registration fee smoothly	
	Billing	Collecting bill form patients, generating report and submitting accounts to the accountant	
	OPD	Doctors are using it smoothly	Need Printer more. Authority will purchase soon.
	IPD	Not Using	System is ready
	Laboratory	Partially using	System is ready

Projects	Name of Running Module	Status	Comments
	Radiology	Not Using	System Ready but need to design template.
	Inventory	System is running except Item.	
	Report	100% working	Preparing as per needs.
Gopalganj Sadar Hospital	Registration	User is giving entry 100%, generating report and collecting registration fee smoothly.	Need to start emergency also
	Billing	Not Using	System is ready
	OPD	Not Using	System is ready
	IPD	Not Using	System is ready
	Laboratory	Not Using	System is ready
	Radiology	Not Using	System is ready
	Inventory	Not Using	System is ready
	Report	100% working	Preparing as per needs.
Bangladesh Secretariat Clinic	Registration	User is giving entry 100%, generating report and collecting registration fee smoothly	
	OPD	Doctors are treating patients through this software.	
	Laboratory	System is running there smoothly	

Projects	Name of Running Module	Status	Comments
	Radiology	System is ready. Soon they will start.	
	Inventory	System is running there smoothly	
	Report	100% working	

Table-1: Different Hospital Status (Module Wise)

4.2 Descriptive Analysis

Surveyed in Sarkari Karmachary Hospital (SKH^[7]) among the patients as well as with the users. There have 120 patients among them different ages male and female were present. Maximum number of patients are happy by getting better services due to implement EMR system. Doctors are giving time to the patients. Patient service increased. Quality of health services developed.

With the experiment, I found the following opportunities:

- Authority can see the overall status of his hospital.
- Authority can decide by following all the information in dashboard.
- Results exceeded the expectation
- In a year, patient increased from 450 to 650 per day
- Patients are very much happy about their service
- Improved healthcare services
- Hassle free service.
- Continuum care of service
- Decision making improved drastically
- Improve Visibility & Transparency
- Streamline Accurate Reporting
- Improved Customer Services
- Improved Quality Control
- Improved Management Visibility
- Unlimited User Support

- Single Data Base Management System

But above results were not only the results. However, there are challenges to implement such digital system, especially for EMR system

Here is a glimpse of the challenges:

- Consistent Power Supply
- Power Backup
- Lack of basic computer knowledge
- Consistent Internet connectivity for real time data synchronization
- User adaptability to the EMR system
- Preparation of Stock list /drug/Master data setup (doctors/client)
- Readiness of Infrastructure
- Local Administrator and ICT Support
- Logistics support
- Change Management

CHAPTER 5

SUMMARY, CONCLUSION, RECOMMENDATION AND IMPLICATION FOR FUTURE RESEARCH

5.1 Conclusions

I have surveyed in different hospital and taken feedback from the authority as well as with the patients. From the survey I have come to the point that with limited resource and lots of barrier automation system rolling out all over Bangladesh. From the above studies came to the point that there have lots of opportunities parallely there have lots of challenges to implement of EMR system in Bangladesh. People of Bangladesh will be benefit form automation system. They do not need to carry their hard copies during getting services from the hospitals. Although EMR systems are anticipated as having positive effects on the performance of hospitals, their implementation is a complex undertaking. This systematic review reveals reasons for this complexity and presents a framework of 19 interventions that can help overcome typical problems in EMR implementation. This framework can function as a reference for implementers in developing effective EMR implementation strategies for hospitals.

5.2 Recommendations

Need to overcome all the challenges regarding opportunities. Also need to plan to roll out this EMR system all over Bangladesh. Manage funds. The first step in any EMR implementation plan is to outline all the tasks and processes which need to be executed by your team of physicians, practice managers, IT staff (and even patients). Need to study more how EMR system can be more effective for the patient.

5.3 Further Study

Need to work out and come the specific points. So that implementation as well as operational process may smooth, and patients may get better service form this automation process. So that authority can work to the point. Then implementation process will be speed up.

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- [2] To know the activity of WHO about their plan and activities regarding Bangladesh
<https://icd.who.int/browse10/2010/en>
- [3] This link is used for standardization of <http://www.hl7.org/>
- [4] This the laboratory standardization <https://loinc.org/>
- [5] Used to know current automation status (Under DGHS) of Bangladesh
<http://www.dghs.gov.bd/index.php/en/>
- [6] Used to know current automation status (Under DGFP) of Bangladesh
<http://dgfp.gov.bd/>
- [7] Where automation is running over there <http://skh.gov.bd/page/42>
- [8] Where automation is running over there <http://www.nicvd.gov.bd/>

APPENDICES

APPENDIX A: EVALUATION FORM-PATIENTS SATISFACTION



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EVALUATION SHEET-PATIENTS SATISFACTION LEVEL

Organization Name:		Evaluation Period/date:				
Patient Name:		Gender:		Age: yrs.		
Please tick to what extend you agree to the statements below. Performance scale: 1= Strongly disagree, 2= Disagree, 3=Same as before, 4= Agree, 5= Strongly Agree ১ = দৃঢ়ভাবে অসম্মতি, ২ = অসম্মতি, ৩ = পূর্বের মত, ৪= সম্মত, ৫= দৃঢ়ভাবে সম্মত ।						
Aspects		Performance Scale				
১.	আটোমেশন সিস্টেমে আপনার রেজিস্ট্রেশন করতে জোগাষ্টি কমেছে। Automation system reduced the registration hassle.	১ দৃঢ়ভাবে অসম্মতি	২ অসম্মতি	৩ পূর্বের মত	৪ সম্মত	৫ দৃঢ়ভাবে সম্মত
২.	ডাক্তার দেখাতে টেস্ট এর রিপোর্ট এখন আর সঙ্গে বহন করতে হয় না। It is not necessary to bring all previous medical records now.	১ দৃঢ়ভাবে অসম্মতি	২ অসম্মতি	৩ পূর্বের মত	৪ সম্মত	৫ দৃঢ়ভাবে সম্মত
৩.	আটোমেশন ব্যবস্থায় চিকিৎসা সেবা গ্রহনে গতি এসেছে। Medical services have got speed due to the digitalization.	১ দৃঢ়ভাবে অসম্মতি	২ অসম্মতি	৩ পূর্বের মত	৪ সম্মত	৫ দৃঢ়ভাবে সম্মত
৪.	আটোমেশন ব্যবস্থার কারণে দালাল কর্তৃক হয়রানি বন্ধ হয়েছে। Due to digital system harassment by the broker has been stopped.	১ দৃঢ়ভাবে অসম্মতি	২ অসম্মতি	৩ পূর্বের মত	৪ সম্মত	৫ দৃঢ়ভাবে সম্মত
৫.	রোগীদের অর্ডি, টেস্ট এবং বিলিং এ আটোমেশন ব্যবস্থার কারণে অনিয়ম ও দুর্নীতি কমেছে। Indiscipline, corruption has been reduced in patient admission, test and billing due to digitalization.	১ দৃঢ়ভাবে অসম্মতি	২ অসম্মতি	৩ পূর্বের মত	৪ সম্মত	৫ দৃঢ়ভাবে সম্মত
Your comment/suggestion/feedback for information:						
Signature:						
Date:						

APPENDIX B: EVALUATION FORM-USER PERSPECTIVE



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EVALUATION FORM-USER PERSPECTIVE (QUALITATIVE)

Organization Name:		Evaluation Period/date:	
User Name:		Gender:	Age: yrs.
Which module are you using of software? (Please select the name of the module) আপনি সফটওয়্যারটির কোন মডিউল ব্যবহার করছেন? (দয়া করে মডিউলের নামটি নির্বাচন করুন)		1. Registration 2. OPD 3. IPD 4. Billing 5. Laboratory 6. Inventory 7. Radiology 8. Report 9. Pharmacy	
1.	Have you got proper training to use the software perfectly? সফটওয়্যার সঠিকভাবে ব্যবহার করার জন্য যথাযথ প্রশিক্ষণ পেয়েছেন কি?		
2.	Does software meet all the requirements of the hospital? সফটওয়্যারটি হাসপাতালের সকল চাহিদা পূরণ করতে সক্ষম বলে মনে করছেন?		
3.	Is patient getting faster service after the establishment of automation system? Would you please explain? আটোমেশন বাস্তবায়নের কলে রোগীদের সেবা প্রদানে গতিশীলতা এসেছে বলে মনে করছেন? কিতাবে?		
4.	Is patient records become accessible? সফটওয়্যার ব্যবহার এর কলে রোগীদের তথ্য সহজলভ্য হয়েছে কি?		
5.	Is it easier to diagnose the disease properly? Would you explain please? আটোমেশন বাস্তবায়নের কলে রোগীদের রোগ নির্ণয় করতে সহজতর হয়েছে বলে মনে করেন কি? করলে কিতাবে?		
6.	Does accounts system have transparency? How? আর্থ ব্যবস্থায় স্বচ্ছতা এসেছে মনে করেন কি? করলে কিতাবে?		

APPENDIX C: STATUS OF ORGANIZATION



Daffodil International University

STATUS OF ORGANIZATION

Organization Name:		Evaluation Period/ date:		
Name and Designation of Information Provider:				
Questions		YES	NO	NO ANSWER
1.	Do you have consistent power supply in your organization?			
2.	Do you have power Backup system in your organization?			
3.	Do you have consistent Internet connectivity for real time data synchronization?			
4.	Does the user have adaptability to the computer & EMR system?			
5.	Is your infrastructure ready to implement EMR?			
6.	Is there any IT team to take over the digitalization system?			
7.	Do you have logistics support to run the automation system			