Dissertation

at

Avisa Smart Hospitals

A study into the implication of smart hospital management and changing trends

by

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A Report

By

Dr. Pragyan Pallav Mishra

On Topic- A study into the implication of smart hospital management and changing trends

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Completion of Dissertation from respective organization

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Has successfully completed his/her Project on

Title of the Project

A study on converting Traditional Hospitals to Smart Hospitals with the assistance of future digital healthcare technologies such as AI, Machine Learning in India.

Date: 10/06/2022

Organization
Avisa Smart Hospitals

He comes across as a committed, sincere & diligent person who has a
a strong drive & zeal for work
We wish him all the best for future endeavors.

Dr. Aswini Naidu
Training&Development

Dilraj Kaur
Zonal Head-HumanResources

Certificate of Approval

The following dissertation titled "**A study on converting traditional hospitals to smarts hospital's with the assistance of future digital health care technologies such as AI, Machine learning**". 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 PGDM (Hospital & Health 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. P

Name	Signature
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Dr. Siddharth Shekhar Mishra	
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TO WHOMSOEVER IT MAY CONCERN

This is to certify that ____PRAGYAN PALLAV MISHRA_____ student of PGDM (Hospital & Health Management) from International Institute of Health Management Research, New Delhi has undergone internship training atAvisa smart hospital from15th March to _15th June.

The candidate has successfully carried out the study designated to him during internship training and hisapproach to the study has been sincere, scientific, and analytical.

The Internship is in fulfillment of the course requirements.

I wish him all success in all his/her future endeavors.

Dr. Sumesh Kumar
Associate Dean,
Academic and Student Affairs
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FEEDBACK FORM

Name of the Student: DR. PRAGYAN PALLAV MISHRA

Name of the Organization in which Dissertation Has Been Completed: Avisa smart Hospitals

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Suggestions for Institute (course curriculum, industry interaction, placement, alumni):

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ABSTRACT

Currently, rapidly evolving digital technological innovations are affecting and changing all sectors' integrated information management processes. Because of the high efficiency of these innovations, the health sector has been forced to undergo a digital transformation in order to improve the technologies and methodologies used in healthcare management systems. The Internet of Things (IoT) technology plays a key role in this transformation, allowing many devices to connect and collaborate. Sensors, connection methods, internet protocols, databases, cloud computing, and analytics are all used as infrastructure in the Internet of Things.Companies can now improve their services, gain business insights from accurate and timely data, improve business processes, and differentiate their offerings thanks to the Internet of Things (IoT). In fact, connecting machines is bringing businesses closer to their customers while also providing a tangible return on investment.The number of malfunctions is increasing as consumers acquire and implement more interconnected IoT devices, and AI will be at the centre of resolving this problem in the coming year.

The number of patients with chronic conditions and the costs of providing modern treatments are increasing in the twenty-first century, life expectancy is increasing, and the World Health Organization estimates that there is a global shortage of approximately 4.3 million health workers. Simultaneously, technology is advancing at incredible speeds. Healthcare is experiencing a hardware and software revolution.In terms of hardware, the use of the internet, mobile phones, and smartphones is on the rise. Artificialintelligence, robotics, genomics, telemedicine, virtual and augmented reality, and other medical technologies are becoming disruptive. In terms of software/information, a vast amount of medical data, peer support, and open-access clinical studies and guidelines are becoming widely available. It not only leads to the possibility of better quality and more information being obtained in healthcare, but also to the possibility of self-care.

Abbreviation

- POC- Point of Care

- AI & ML- Artificial intelligence & Machine learning
- HIMS- Hospital information management system
- IOT- Internet of Things
- EMR- Electronic Medical Record
- EHR- Electronic Health Records
- HIPAA- Health Insurance Portability and Accountability Act
- WBAN- Wireless Body Area Network

Figures

CHAPTER 1

Overview of Smart Hospitals

Introduction:

Avisa Smart Hospitals

Avisa smart hospital is built on the back of advanced technology and smart hospital features including cloud computing, artificial intelligence and machine learning. With Avisa Smart Hospital management software, moving from a traditional hospital setting to a smart one involves software installations, interconnected management systems, devices and equipment that transform clinical processes and the overall hospital management positively with patient management app. With our smart hospital solutions, we aim to create a smart environment that fosters better interaction between the various working systems of a hospital inclusive of features like book hospital bed online and book doctor consultation online.

Smart pharmacy enabled digital prescription (with sensor enabled pen and paper – which would follow the doctor's method of writing their own prescription in paper. Through AI (artificial intelligence) the paper would automatically capture the patient's digital prescription into the patient as well as the doctor’s app.

A revolution led by doctors to empower the healthcare ecosystem & its key stakeholders

Born from the objective of bridging the gap between healthcare services and optimal patient care, Avisa Smart Hospitals is disrupting the way hospitals, clinics, diagnostic centers, and pharmacies operate utilizing a highly integrated hospital managementsoftware. Our team is led by highly experienced doctors who hold not just first-hand experience of the existing gaps within the healthcare system but also a futuristic vision and passion for resolving them. After years of collaborative efforts, brainstorming and research, we are bringing together the best of technology and leveraging it to expedite the future of healthcare in India and globally.

To facilitate this transformation, we are equipping the healthcare space with smart infrastructure, interconnected management systems, software installations, patient health card and state of the art equipment. With patient-centric care at the forefront of our smart solutions and smart hospital features other than our provision of medical health card, we

are enabling a quantitative leap in the experience patients have within hospitals and beyond. With services that present the best of innovation and practical application, we are laying down the path for hospitals to extend quality care while benefiting from optimized costs, operations and management.

Our Vision

We endeavor to create a positive change within the healthcare space to empower hospitals with improved efficiency and patients with better care and be viewed as global leaders facilitating this movement on a magnified scale.

Our Mission

We are striving to be the one-stop solution to all the management, operations and growth-related woes of hospitals and clinics by pioneering the smart hospital revolution across India and worldwide.

Transforming traditional hospitals in smart hospitals features:

 **Hassle-free smart digital billing**

 **Digital health records for easy maintenance**

 **Real-time updates with kiosks & display systems**

 **Medical IoT devices for error-free diagnosis**

 **Improved patient monitoring**

 **Interconnected management systems**

Improved patient queue management

Telemedicine for remote healthcare

E-prescription & seamless data transfer

Reduced cost burdens & quality gaps

Optimized staff & workflow management

Easy access to lab & diagnostic reports

Fig 1.1

Improved Operational efficiency of hospital:

Avisa is making it easier for hospitals to provide a better experience to patients by empowering them with the best of technology and equipment.

1. Hassle-free smart digital billing

Making it trouble-free for hospitals to manage their billing processes with automation, to ensure improved efficiency for hospitals and less inconvenience for patients.

2. Digital health records for easy maintenance

Resolving the need of hospitals to keep stacks of patient records or disorganized medical records through digitization, to make scrolling through patient reports possible at the tip of the finger.

3. Real-time updates with kiosks & display systems

Enabling better patient satisfaction for hospitals with real-time tracking of treatment status, diagnostic tests & more, while keeping the hospital staff updated about the same through our display systems

4. Medical IoT devices for error-free diagnosis

We empower doctors and hospitals to provide the most optimal patient care with error-free diagnosis through IoT devices, by assessing an augmented data of patient's vitals & health.

5. Improved patient monitoring

Be it within the hospital or remotely, we enable hospitals to monitor their patients effectively with smart wearables, sensors, automated processes and optimal communication between doctors and patients.

6. Interconnected management systems

With interconnected systems, the entire management of hospitals gets streamlined, wherein staff allocation, scheduling, and data transfer between departments can be made seamless

7. Improved patient queue management

Easy appointment booking online as well as at the kiosks enables hospitals to navigate the hassle of long queues at the desk, wherein even the patients can benefit from saved time & effort.

8. Telemedicine for remote healthcare

Enabling hospitals to extend quality patient care remotely so that they can better adapt to the growing popularity of online consultations & provide better care to even far-away patients.

9. E-prescription & seamless data transfer

Empowering hospitals to go paperless in the day-to-day dealings of doctors, including prescriptions, while making the transfer of data from one hospital department to another as quick & efficient as possible.

10. Reduced cost burdens & quality gaps

With better inventory, financial, operational, equipment & reputation management, hospitals can navigate the excessive expenses associated with non-optimal management & disorganized finances

11. Optimized staff & workflow management

Facilitating better communication and information transfer between hospital staff to avoid delays and human errors in hospital workflows, as streamlined operations mean a more efficient hospital environment for doctors and patients.

12. Easy access to lab & diagnostic reports

With seamless data transfer and storage of data at the cloud server, we make it convenient for doctors to digitally access the diagnostics reports of the patients for optimal diagnosis.

13. Patient-Centered Care

Patient-centered care exists in a pragmatic paradigm with multiple realities and diverse human perspectives. The healthcare professionals recognize that individual beliefs and circumstances influence the patient's preferences and choices for illness prevention and treatment. The healthcare members form a collaborative team and interact respectfully with the patient and family. The team develops a trusting relationship with the patient-

family-unit. The team members are open and candid about the patient's health status and engage the patient and family members. Collectively, the patient and family partner with the healthcare professionals to make decisions about the plan of care, which in turn facilitate patient satisfaction and impact the quality of patient outcomes.

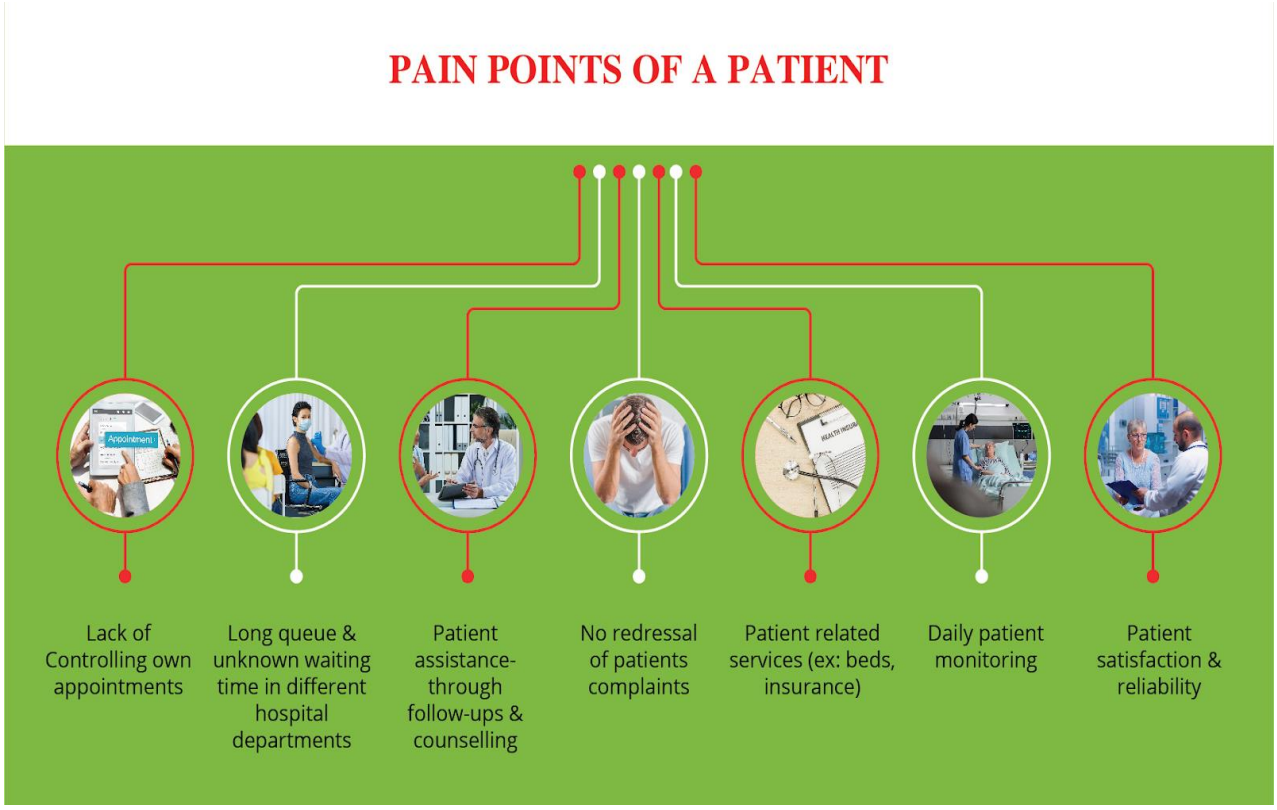

Fig. 1.2

CHAPTER 2

PROJECT OUTLINE

INTRODUCTION-

To enhance their productivity, quality, and safety, most electronic health records now require more development of features that patient-centered medical homes demand. To attain these goals, we present a road map of domains that must be addressed. We believe that electronic health records will be significant in seven areas: telemedicine, quality and efficiency monitoring, care transitions, personal health records, and, most importantly, registries, team care, and clinical decision support for chronic diseases. Medical homes should be included in emerging electronic health record regulations in order to support this growth. More study is also required to determine how these records can improve team care.

Text messages, emails, and push alerts are examples of digital triggers that are used to direct an individual's attention to a specific goal by inducing an internal or external reaction at the right time. Triggers are thus critical in engaging people with digital interventions delivered outside of typical health-care settings, when other life events and variable motivation to engage in effortful behavior occur. A growing body of research is looking into the use of digital triggers for both short-term and long-term behavior change.

The deployment of 5G technology across the globe has accelerated. The cellphone standard is forming in many major urban areas, and if it isn't ready for use in your medical clinic's former neighborhood yet, it will most likely be soon.

PROBLEM STATEMENT-

In order to provide excellent patient care at a minimal cost, hospital needs smart diagnostic procedures that are safe, efficient, accurate and less time consuming.

Additionally, the entire hospital will be digitally connected, along with automated registration and appointment system

Objectives of the study-

- To build a realistic and operational smart hospital (the availability and use of meaningfully interconnected systems and devices that lead to overall smartness to deliver optimal patient care by making the most of advanced ICT)
- To recommend appropriate suggestions for transforming traditional hospitals into smart hospitals
- To facilitate quicker decision making by the hospital staff members with the usage of digital devices such as Doc Pen, one stop solution app, IOT device, and so on

Research methodology-

Exploratory research study- Our focus will be on the exploratory research conducted in transformation of traditional hospitals in smart hospital.

An exploratory case study looks at different phenomena that are characterized by a lack of extensive preliminary research, particularly formulated hypotheses that can be tested, and/or a specialized research context that restricts the approach options.

Outline of the research approach –

- Collection of secondary data through google reviews, past articles, newspaper, narrowing down a difficult or nebulous problem that has not previously been studied- Polar interrogative,
- Focus groups- Department wise 5-6 staff discussing what they think of smart transformation in hospital (open-ended interviews) & survey out to the organization asking about the gaps in hospital, highly interactive
- Collected data from hospital about the use of new technologies in hospital- past hospital surveys & reports- through HIS
- Case study

Literature Review-

In 2009, IBM (Armonk, NY, USA) proposed the "Smart Planet" concept. Simply said, Smart Planet is an intelligent infrastructure that perceives information with sensors, communicates it via the internet of things (IoT), and processes it using supercomputers and cloud computing. It has the ability to coordinate and integrate social systems in order to achieve human society's dynamic and refined administration. Smart healthcare is a health-care delivery system that uses IoT and mobile apps to dynamically access information, connect people, resources, and institutions in the healthcare ecosystem, and then intelligently manages and responds to those needs. Smart healthcare can promote interaction among all stakeholders in the healthcare industry, ensuring that participants receive the services they require, assisting parties in making informed decisions, and facilitating resource allocation. In a nutshell, smart healthcare is a higher level of medical information architecture.

Qi *et al. [18] in this* review, the authorevaluated different IOT applications in smart healthcare from various angles (i.e., Blood pressure monitoring, monitoring of oxygen saturation, health beat monitoring etc.). Secondly, the author reviewed the existing work of IOT that enable technologies for smart healthcare applications. From various perception, such as infrastructure and current technologies (i.e., Networking, Sensing and Data processing technologies).

Islam *et al. [19*] In this review, the author centered on IoT-based healthcare technologies and present architecture for healthcare network and platforms that support access to the IoT backbone and enable medical data reception and transmission Second, the paper provides detailed research events and how the IOT can be used to address chronic disease supervision, pediatrics, elderly care, and fitness management.

Baker *et al. [20]* In this review, the author presented a new model for a future smart healthcare system that can be applied to both special (i.e., special condition monitoring) and general systems.Secondly, the author presented the overview of the state-of-the-art works related to the component (I.e., wearables and non-intrusive sensors monitoring blood pressure, blood oxygen level and vital signs) of the presented model. Secondly,

the author review on short-range and long-range communication standards for smart healthcare.

Dhanvijay *et al.* In this review, the author emphasized various IoT-based healthcare systems for wireless Body Area Network (WBAN) that can enable smart healthcare data reception and transmission Second, the author provided a thorough examination of resource management, power, energy, security, and privacy issues in IoT-based smart healthcare.

Hyuktae Kwan *et al*Smart hospital services can be classified into the following types: services based on location recognition and tracking technology that measures and monitors the location information of an object based on short-range communication technology; high-speed communication network-based services based on new wireless communication technology; Internet of Things-based services that connect objects embedded with sensors and communication functions to the internet; mobile health services such as mobile phones, tablets, and wearables; artificial intelligence-based services for the diagnosis and prediction of diseases; robot services provided on behalf of humans in various medical fields; extended reality services that apply hyper-realistic immersive technology to medical practice; and telehealth using ICT.

Design of Iot Based Smart Health Monitoring and Alert System (2015-2016) This paper presents a reconfigurable sensor network for structural health monitoring. Real-time and periodic structural health monitoring can reduce the probability of collapse and the consequences of potential life-threatening conditions. Computer communication systems and Internet plays an important role. NFC technology to fetch patient complete information automatically when doctor approaches patient. Biosensors interfaced with the microcontroller will monitor patient's vital health. If any of the sensor's preset threshold value is exceeded beneath, an SMS will be sent to doctor and the patient's caretaker.The monitoring system comprise of web server part: The sensor network in which the sensor nodes are equipped with different biometric sensors, sensor data will be regularly transferred to hospital database from which it is upload to hospital's webserver continuously. doctor can monitor the patient condition from any place.

IOT based Patient Health Monitoring System (2016-2017) In any critical condition the SMS is send to the doctor or any family This paper gives us the development of a microcontroller-based system for wireless heartbeat and temperature monitoring using Wi-Fi module. By this we can easily provide real time information available for many users and can send them alert in critical conditions over internet. In India many patients are dying because of heart attacks and reason behind this factor is that they are not getting proper help during the period. To give them timely and proper help first we want to continuous monitoring of patient health. The fixed monitoring system can be used only when the patient is lying on bed and these systems are huge and only available in the hospitals in ICU. The system is developed for home use by patients that are not in a critical member. So that we can easily save many lives by providing them quick service.

CASE STUDY- Transforming Clearmedi hospital & Cancer center, Vasundhara, Ghaziabad into Avisa smart hospital

Exploratory research methodology- Investigation, Gap observations, online research. Annual reports, daily reports, hospital checklist surveys.

Before	**After**
• Doctor not available at OPD timing, patient can take pre-appointment only by calling Clearmedi hospital,Doctor was available only for one hour (timedoes not fix) in OPD, everything used tobe done manually • Lack in Operational planning of hospital- timing of doctors, no training to staff responsibilities and duties, inactive posts of senior	• Smartly prepared ICT will increase the preciseness of healthcare management services, because of possible trimming down of the error creation. • This will augment the efficacy of the operational system. • The quality of the healthcare management services will get better and this will generate patient satisfaction. • Healthcare ICT will make the organizational management cost-

management in hospital, low patient acquisition in nearby areas. • High maintenance of accounts of hospital like outsourced pharmacy charges, laboratory, grants for operating needs of hospital, x-ray etc.	effective, thus, hospital management can after quality services to clients at affordable cost.

Layout- Gap Analysis, Patient acquisition, Patient retention, patient comfort & affordability, Ease of access through smart systems, Marketing & sales.

Scope of services	departments (floor wise)			
Internal medicine	Basement-	FIRST FLOOR	FORTH FLOOR	SIXTH FLOOR
General Surgery	Store & laundry	ICU	Delux room	General Wards
LAP Surgery	UPS room	Doctor room	ICU	CSSD (AMC)
Neuro Surgery	Dexa room	OT	HDU (icu-2)	KITCHEN
Ortho Surgery	CT Scan	Waiting room	Occupancy	Office
Gynaecology/ Qbstetrics	IT Department	Washroom	Lounge international patients	NICU
Psychiatry(OPD)	Mammography	Nursing counter	Doctor duty room	UPS
NICU (Pharmacy care)	General store	SECOND FLOOR	Nursing counter	Nursing counter
Urology	X Ray	Nursing counter	FIFTH FLOOR	
			Maintenance Room +	
Nephrology	Physiotherapy	Maternity ward	Biomedical	
Paediatrics	Quality room	Wards	MRD	
ENT	Conference room	Dialysis	LABS	
Gaestroenterology(Medical)	Account dept	Admin room	Biochemistry	
Medical oncology	HR dept	THIRD FLOOR	Hormone	
Surgical oncology	GROUND FLOOR	Wards	CBC	
Cardiology Interventional	Reception	semi-private	PT INR	
Physiotherapy	OPD	private	Cell counter	
Facilities	Procedure room	General ward 1	Hematology	
Radiotherapy(outsourse)	Nursing counter	General ward 2	Urine	
Pathology	Pharmacy	Nursing counter	BLOOD BANK	
Digital X Ray	Ultrasound	Bone marrow transplant room	(All Machines)	
Dietary service	ECHO/TMT/HOLTER	Medical Transcription room	Apheresis room, donar room	
ICU,CCU, & MICU	Emergency	Neuropenic isolation room	Nursing counter/ doctor screening room	
BLOOD BANK	Oxygen plant		MRD	
MAMMOGRAPHY	Fire safety department			
CT SCAN				
PET CT (OUTSOURSE)				
DIALYSIS				

Fig. 2.1

Chapter 3

Access, available, affordable and awareness about healthcare technologies

QUALITY OF CARE-

Health care in the future will be decentralized and patient-centered, with smart hospitals. "Smart hospitals do not attempt to deliver all services under one roof; rather, they deliver a narrower set of high-value services within a broader ecosystem of entities, many of which have not traditionally been associated with health care delivery," according to McKinsey.

Quality is one of the most commonly used terms in health care. However, there are no clear definitions. Six components of quality in health care for the twenty-first century: safety, effectiveness, patient-centeredness, timeliness, efficacy, and equity. Medication alerts, clinical flags and reminders, better tracking and reporting of consultations and diagnostic testing, clinical decision support, and the availability of complete patient data all have the potential to improve patient safety.

- Staff availability - doctors ,nurses and support staff nurses patient ratio 2:1
- Bed Availability and turnaround time for making bed
- Reporting time of investigations
- Design and test best practices for reducing errors in multiple health care settings.
- Develop the science base to inform these efforts;
- Improve provider education to reduce errors;
- Capitalize on IT advances to translate effective strategies into widespread practice; and
- Build capacity to further reduce errors.
- Making it trouble-free for hospitals to manage their billing processes with automation, to ensure improved efficiency for hospitals and less inconvenience for patients.
- Resolving the need of hospitals to keep stacks of patient records or disorganized medical records through digitization, to make scrolling through patient reports possible at the tip of the finger.

Interpersonal skills displayed by medical professionals-

The way medical personnel responds to their needs and requests is a factor that contributes to the medical unit's increased prestige and growing interest from patients and customers. Activities carried out for the purpose of developing, placing, pricing, or promoting medical services are referred to as health services marketing.The marketing mix is incomplete without communication. It is the tool by which an entity engages in information exchange with various elements of the business environment, informs them of their presence and services offered, fosters a positive attitude, and encourages consumers to purchase services.

It should be remembered that medical system communication occurs in a complex environment in which positive and negative factors coexist and constantly exchange places and importance. Communication in medicine takes many forms and can be seen in a variety of situations, the most important of which is undoubtedly that between the patient and the doctor, which provides much of the data needed for diagnosis. Interpersonal communication is made up of verbal (oral and written) as well as nonverbal (gestures, mimics, posture, movement, and appearance) and paraverbal forms (by voice attributes accompanying the word, such as intonation, the inflection of voice, tone, rhythm, verbal flow). It can be influenced by several factors, including: - the degree of closeness or spatial proximity.

- the limits and the extent of physical contact in these relationships.

- the friendly or authoritative style of communication.

- the exchange of glances that form visual communication.

- the volume and pace of the interactions.

- the dynamics of reciprocal self-development.

Technology has the potential to be a complete solution to the problem of poor communication in healthcare. To achieve effective communication in this industry, various technologies can be combined with current healthcare practices.

Transparency and communication between care provider and patient-

Patient Contentment-

When all aspects of the healthcare process are completed quickly and according to the patient's expectations, patient satisfaction is achieved. Patients expect their medical team to provide them with high-quality care:

- pay attention to issues
- carry out regular follow-ups
- keep you informed of their progress on a regular basis provide adequate explanations for each step of the healthcare procedure
- provide high-quality care while securely managing medical records

Only if the healthcare team communicates with the patient on a regular basis and focuses on their expectations and needs can this be accomplished.

Transparency

People spend a lot of money in the healthcare industry in order to receive high-quality care. As a result, they anticipate that the entire process will be transparent. If a patient comprehends everything from the pricing structure to the reasons for their medications, they will feel included and satisfied. It encourages patient loyalty and promotes a positive image of the company. Transparency can be maintained if healthcare providers communicate with their patients on a regular basis to keep them informed about all procedures, diagnoses, and changes to their treatment plans.

Regular Follow-Ups

Regular follow-ups are crucial because they allow doctors to see if the patient is following the treatment plan.

- They can help doctors figure out if a patient is having any negative drug reactions.
- It is only possible if the healthcare team communicates with the patient on a regular basis and focuses on their expectations and needs.
- They help determine whether a prescription or treatment change is necessary.

Recommendations Based on Research

When the medical team is fully informed about the patient's medical history as well as the most recent medical developments, they can provide better treatment and prescription recommendations. However, staying current on the patient's medical condition is only possible if the team communicates with the patient on a regular basis and effectively listens to the patient's inputs.

Five technologies that can ensure effective communication in healthcare sector are:

1. Electronic Health Records (EHRs)
2. Telemedicine
3. Block chain Technology
4. E-Prescriptions
5. Remote Patient Monitoring

Financial aspects of care-

The industry has benefited greatly from technological advances over the last several decades. However, the cost of some technological advances is partly to blame for the overall increase in health-care costs. In fact, new medical technology accounts for 40-50 percent of annual cost increases.

Native mobile apps: Software that comes preinstalled on a mobile device (e.g. software that operates a device’s built-in camera).

• Downloadable mobile apps: Software that is not preinstalled on a device and must be downloaded from an external source, usually a mobile app store.

• Web-based app: Software that connects to an internet portal and displays content on a mobile device. Requires an internet connection

New interaction technologies and sensors seamlessly integrated in such environments provide a variety of personalized and context-adapted medial support, such as assistance with daily activities, monitoring personal health conditions, improving patient safety, and gaining access to social, medical, and emergency systems.Smart healthcare applications have the potential to provide medical, social, and economic benefits to a wide range of

stakeholders by offering a variety of services. The goals range from improving comfort to assisting with autonomy enhancement to emergency assistance (detection, prevention, and prediction).

Accessibility of care-

It is important to unearth a smart clinical management system for a positive patient experience at all times.

Better management of schedules

Better management of appointments and schedules is the starting point of an improved clinic management system. Automation saves the patients from the hassles of traditional walk-ins. An automated clinic helps provide patients to receive care in a more integrated manner and consult doctors with convenience.

Better accessibility to patient data and records

A matter of concern for clinics is patient re-visits. Automation and digitization enable better care delivery and access to patient records in the form of Electronic Medical Records and Electronic Health Records for an effective treatment process.

Increased safety and privacy of patient records

Patient records need to be essentially safe-guarded and must be properly accessed. Traditionally storing patient records in patient cabinets decreases the efficacy of healthcare provision. Automation provides the perfect solution for the hassle of storing medical files, wherein patient data can be accessed digitally by the healthcare provider and the patient.

Error-free healthcare outcomes

The most frequent errors at a clinic are due to human errors. Digitization and automation of clinics will eliminate the need for human interventions.

Improved coordination and communication

A great amount of the patient's time is wasted due to a lack of coordination and communication within the healthcare departments at a clinic. Automated platforms and

highly integrated healthcare systems backed by IoT and digital prescriptions improve healthcare delivery, facilitating higher patient retention, engagement and satisfaction.

Effective utilization of resources

Automation of healthcare processes facilitates a better utilization of healthcare resources. Effective storage of data and interconnected technology supports a top-notch clinical management system. Only the most mandatory resources are utilized in a digitized clinics system, leading to greater savings, adding to the profitability.

Improvised operational efficiency

Automation changes the way in which clinics function. A number of manual systems undergo a huge change when it comes to automatizing the entire healthcare ecosystem for higher efficiency and accuracy. Be it seamless billing processes, coordination between doctors and patients, scheduling of appointments or the management of inventory, higher efficiency ensures a visible change, positively impacting the overall staff performance.

Improved staff performance

As a result of automation of clinics' processes, the healthcare staff will experience a greater self-worth and an improved utilization of skills.

Chapter 4

Gap analysis of operational efficiency in hospital

Patients choose and evaluate their healthcare providers based on operational efficiency. As a result, patient experience and feedback are important in improving quality. Thus, operational efficiency serves as a missing link in which patients and providers seek to learn from one another in order to improve healthcare quality. The voice of consumers and patients on what constitutes "satisfactory medical care" is largely ignored.

Waiting time can be used to measure operational efficacy, which is an important component of quality, specifically experiential quality in the context of patient-centric healthcare. Waiting time is a patient-centric metric that is typically associated with the time between checking in at the hospital front desk and meeting with the doctor. Clinical quality is also affected by operational efficiency. For example, increased patient waiting time in emergency departments and inpatient settings has resulted in lower patient satisfaction in specialty and primary care (outpatient settings).

Patient satisfaction is at the heart of a patient-centered approach to evaluating and improving healthcare delivery. Patient satisfaction is defined as a patient's assessment of their overall experience at a healthcare facility as well as their diagnostic or treatment journey. Patient satisfaction and engagement are not only becoming more important as patients take an increased role in selecting their healthcare plans and healthcare specialists, but they are also serving as a de facto indicator of healthcare quality. It is frequently linked to performance indicators such as profitability and growth.

Despite its growing importance, patient satisfaction remains a poorly understood concept. In contrast to clinical quality, which seeks to evaluate physicians based on technical performance while focusing solely on cure, experiential quality emphasizes a well-tailored approach to providing care rather than just cure. This caters to the patients' individual needs.

The interplay and relationship between a patient and a physician is reflected in interpersonal quality. Communication is crucial in this situation. It is an important aspect of operational efficiency that extends beyond scheduling a doctor's appointment. It focuses on the patient's psychological state based on the development of the relationship and interaction between the doctor and the patient.

Higher operational efficiency, as facilitated by Avisa's operations and management model, is facilitating improved and technologically advanced operational management of hospitals, supported by smart hospital management software and smart patient management systems.

	Gap Analysis					
	AFTER AVISA ONBOARDING					Before Avisa onboarding
A)	Reception & Billing department	Yes	No	Remarks	A)	Reception & Billing department
1	Long queues				1)	Is Long queues present
	If yes TAT				2)	is any queue management system available
2	Any queue Management System available				3)	Adequate manpower present on front desk of ho
3	Support Staff/ Patient care cordinators present at the reception area				4)	Center manager of hospital available
4	Full Staff efficiency at reception				5)	Patient flow
5	No.of employees in the billing counter				a)	Adequate
6	Billing				b)	Moderate
a)	Through HIMS				c)	Inadequate
b)	Any other biling software				6)	Billing
c)	Is there any manual collection at front desk				a)	Through HMIS
7	Patient Kiosk Available				b)	Any other biling software
8	Pateint Flow				c)	Is there any manual collection at front desk
a)	Adequate				B)	APPOINTMENTS BOOKING
b)	Moderate				1)	Any provision of online booking prior present in fa
c)	Inadequate				2)	Appointment note: is present
	Patient coming to the Hospital				a)	Appointment date
a)	As Emergency case				b)	Appointment time
b)	By Self/ family/ friends				c)	Doctor information
c)	Avisa app pre- booking				d)	Review note from last visit
B)	Appointments Booking				e)	medication list
	Auto- registration available				f)	Copy of appointment notes
	Booking done through calls				g)	Complaints or symptoms
	Any other methods of appointment booking - please explain in detail in remark section				h)	Visit Notes
	Appointment note is directed to Pharmacy and Lab				i)	Do patient need any prior authorization
	Patient is well informed about digitization at hospital.				j)	Is doctor contact avalable via mail phone/web

Fig. 4.1

	AFTER AVISA ONBOARDING				Before Avisa onboarding
	OPD	YES	NO	RE	OPD
1	QR code precent at OPD reception				Waiting time at surgical clinic (moment patient entered in queue to finally being consulted)
2	Patients are using health card facility				Avalability of consultation services for common illnesses
3	Patients giving feedback right after treatment				Primary Management of wounds & First Aid
4	Appointments is pre booked				Primary management of Trauma & bone injuries
5	Rescheduling done through the Avisa portal for				OPD Services are available for atleast 6 Hours in a day
6	1/ 2 manpower at OPD for patient retension				Emergency services are functional 24*7
7	All quality standards are optimum at OPD				Availability of Drug dispensing counter/ Pharmacy services
8	IOT device is present at nursing counter				The facility provides medico legal services
9	Doctor have e-prescription device with them				List of available services in the OPD are prominently displayed
10	Is patients linked with diagnostics				Timing and days of the OPD and other clinic services are displayed
11	Is patients linked with pharmacy				Availability of Booklets/ leaflets/ brochures in the waiting area for Health education and information about different programmes & schemes
12	The doctor advices for the admission in the Admission note form for OP patients.				Patient is informed about the diagnosis, & Trearment Plan
13	Patient is admitted based on their choice and availability of type of beds.				A copy of OPD slip / Prescription containing Diagnosis & tratment plan, is given to patient
					Method of Administration / taking of the medicines is informed to patient/ their relative by pharmacist at the dispensary
					Dedicated Female OPD staff
					Average door to drug time (time taken by a patient from entering in queue for OPD registration to finally setting drugs at drug dispensing counter)

Fig. 4.2

	BEFORE ONBOARDING OF AVISA		AFTER ONBOARDING ON AVISA
	LAB - Checkpoints		DIAGNOSTICS
1	All lab services are available during OPD hrs	1	Integrated tests- lab test, combined lab test easy access in Avisa portal.
2	All Radiology services are available at the facility	2	Reports and recommendations in the Health records of the Hospital & Patient.
3	Availability of clinical pathology	3	Booking online test and sharing reports is linked with centre, scan PDC at Avisa centre & save and share report to Doctor.
4	Availability of routine hemetology tests	4	Portable health monitoring system, when paired with Avisa app allow caretaker to test and track vital signs.
5	Blood grouping and Rh typing		
6	Availability of Serotology tsets (Rapid)		
7	Availability of Microscopy tests		
8	Laboratory provides specific test for local health problems/diseases		
9	Confindentiality of patients, records and clinical information is maintained		
10	Departments has adequate space as per patient load		
11	The facility has adequate medical officers as per service provision & work load		
12	The Staff has been imparted necessary trainings/skill set to enable them to meet their roles & responsibilities		
13	Availability of equipment for storage		
14	The facility has system for maintenance of critical Equipment		
15	The facility ensures comfortable environment for patients and service providers		
16	Facility has policy of removal of condemned junk material		
17	The facility provides appropriate referral linkages for transfer to other/higher facilities to assure the continuity of care.		
18	The facility ensures that standardised forms and formats are used for all purposes including registers		
19	The facility ensures safe and adequate storage and retrieval of medical records		
20	The facility ensures segregation of Bio Medical Waste as per guidelines		

Fig. 4.3

Results:

- Quantified self devices: objective monitoring of health and health behaviors – These devices collect, measure, and compare a variety of biological, physical, behavioral, and environmental parameters related to lifestyle activities like sleeping, eating, and physical activity to improve well-being and maintain or improve the subject's health.
- Smart devices as a source of social valorization- Smart device users are typically members of internet-connected communities with the dual goal of valuing their efforts and encouraging reassurance in a variety of ways.
- Smart devices in health care relationships—a mediator of participatory medicine, the use of smart devices in preventive or curative health care relationships introduces a form of "media medicine" or apomediation, which refers to remote mediation between the patient and his or her body away from the doctor, resulting in a new doctor/patient relationship articulated around scientific and lay knowledge, leading to the emergence of new health care models.
- Smart devices as a support for behavior change- marker of a new prevention model, the device as a tool for activity quantification, allowing users to track their activities, evaluate their progress, and project their progress toward a goal. As a result, it functions as a self-construction tool that provides an objective measure of self-control, assuming that these variables can define the self. Establishing oneself as a member of the community. The device provides an opportunity to seek advice and encouragement as a vector of collective socialization, this mediation breaks down knowledge barriers, redefining the relationship between patients and health care professionals, as well as between professionals concerned with curative or preventive management, which is transformed as a result in terms of scientific foundation and methods.

Chapter 5

Deployment of digitalized healthcare technologies

Healthcare challenges have been overcome by digitization in such a way that it has redefined people's perceptions of healthcare delivery and changed their attitudes toward health-related services. Most importantly, the adoption of automation and digitization has strengthened the bond between a healthcare provider and a patient. Smart hospitals, for example, must understand the patient's needs and the myths that tend to surround them from the perspective of healthcare providers. The healthcare industry can overcome these obstacles by leveraging digitization and automation to make smart and informed decisions, such as customer, marketing, and data analytics to recognize patient needs.

Hospitals must strive to make smart yet efficient use of technology to build a foundation that caters to providing the best set of medical services to patients while also making their stay at the hospital as pleasant as possible, from registration to discharge. One of the most technologically effective methods to make a patient the focus of the healthcare provision approach is predictive technology, which can use existing data to understand every patient's requirement and optimize it to predict the future in terms of healthcare. Furthermore, for patient security, healthcare quality, and revenue generation, optimizing the patient flow rate by effectively utilizing technology is critical to healthcare delivery systems.

Patients are not looking for new ideas. They expect processes to be carried out efficiently, resulting in greater accessibility to healthcare organizations. The challenges of poor coordination between the doctor and the patients, manually completed administrative tasks, data security, and real-time information about health-related issues are all overcome by digitization and automation. Patients and doctors can keep track of their medical records with the help of digitization, which allows for better coordination.

Automated administration in hospitals saves money and improves the level of interaction between multiple healthcare providers. This is critical because many patients have medical conditions that necessitate the services of a team of specialists or physicians. Many of the challenges that the health-care sector faces can be overcome by a

continuous flow of information between health-care providers and patients, thanks to digitization and automation.

HIS-

It's a software-based support tool that lets you manage your patient's data, schedule appointments, manage tasks, and manage your work schedule. Computer science, support network selection, telemedicine, morality, global health computing, translational research, and home care are some of the topics covered in this tool.

TASKS LIKE--

REGISTRATION	**APPOINTMENT**	**ATD**	**BILLING**
-Capture Patient's Profile Picture through Web Cam. -Provision to see Patient's clinical History -Capture Patient's Biometric Thumb impression - Country Id interface -VIP Marking -Name Masking -Vulnerable Patient Marking -Family Tagging -Duplicate Check -Plastic Card/ Smart Cards -Kiosk Interface -Self Custom Fields -Promotional -SMS/Email - Multiple types of -Registration - Attach Documents Patient Outstanding Indicator Company outstanding ageing analysis: Track and maintain pending bills	-Walk In Appointment -Online Appointment -Mobile App Appointment - Resource Appointment -Recurrent Appointment -Payment Gateway -Break & Block -Appointment Transfer from one Dr to another -Future Appointment Booking -MHC package Appointment. -Provision to capture Appointment -Request in case of Overflow. Provision for Slot Reservation. -Provision for Home Service Sample Collection	-Real time Bed Status -Insurance -Tagging - Status wise Bed Color -Bed Allotment System -Attendant Pass with picture -Barcoded Wrist Band -Face Sheet -Multiple Barcodes for file -VIP Marking -MLC Marking **Audit Trail Module** Enable tracking of any financial changes such as bill cancelled, service amount change and discounts, patient category change, refunds etc. Auto Mails are sent to Management and finance team for changes done.	-Single bill feature for OP services and Pharmacy items -Refund Cancellation Process -Credit Note Cancellation Process -Email facility of OP/IP bills and receipts to the patient -Patient can view their OP bills anytime on their mobile (SMS feature) -Enhancement for save -Machine & IP address against all transaction form like OP Bill, Advances, Refund, Credit note, IP Bill so we can identify transaction location -Printing of Company wise -Provision for N-level Tariff tagging -OTP need to generate at the time of "Refund request" at Patient registered mobile no. That -OTP is a must to save a Refund Request -Provision for service tariff variance for Bed Category

	Appointment & billing	**Key Performance Indicator** -Surveillance register that document the operation theater functioning.	by Percentage and Fixed Amount -Patient tracking of Resource appointment and admission advice Deposit exhaust in package rendering Package Billing against surgery booking -Patient clinical history in Registration
SURGERY BUDGET -Provision for Package based Surgery Budget -Provision for Multiple Bed category Surgery Budget (Room Rent and Doctor visit auto calculation) -Provision for Budget History Based on Surgery for quick estimation	**SINGLE BILLING** -Provision to do billing for Medicines (With / without Generic based Prescription) -Provision to reorder Old Prescription Provision for Dispensing Medicines after billing from Inventory -Provision for Queue Management TV screen for Pharmacy -Provision for auto printing bills from multiple printer multiple places	**PACKAGE RENDERING** -Provision for Deposit Exhaust and Package service Close Option **PR TRACKING** -Admission Advise tracking system MHC TV Screen Radiology service Advise tracking system	**INSURANCE** -Insurance Dash board: A patient's complete information is available at a single place with color status -Insurance Tracking: Track and maintain insurance services such as Pre-auth, approval and rejection which helps to improve RCM and money realizations -Patient's amount overflow (billing exceeds the total approved amount) information is available with insurance desk -All investigations reports & discharge summary printing is available with Insurance desk

EMR

-Improved Find
-Patient List.
-Provision to see vacant slots and breaks/blocks.
-Provision to create/cancel breaks from the list itself.
-Compound Medications.
Consumable ordering in same indent by Nurses

RADIOLOGY

Radiology workflow thru Resource Appointment module
Patient Tracking for Radiology Services advised by Physicians
Random Search on text based reports for reporting/statistical purposes

OT

-Provision for queue Management with TV screen
-Provision for Package billing for surgery booking
-Provision for Doctor wise OT Tagging
OT Scheduling Rules/Processes

Critical Result Alert

-Any test result require rapid clinical attention a SMS send to specified Doctor

INVENTORY

-Auto department issue is made on the base of ROL level & department needn't to send the department indent
-Least quotation entry rates in P.O. are picked by the system automatically
-Auto calculation of ROL & ROQ on the base of consumption
-Generic base item issued according to items set for CGHS & other company patients. If any generic item is tagged to a specific company then that item will be picked by system automatically irrespective of other brand's item is indented from the ward of the same generic
-Printing of a set of many purchase orders in a single command
-Sending a set of purchase orders through emails with a single command to all the suppliers
Quotation comparison
-Provision for quotation comparison
-Provision for ROL calculations based on average consumption
-Provision for Budget allocation and restriction for Purchase
-Provision for auto batch selection while Department issue, IP Issue and substitute item selection

LABORATORY

Delta check is provided during result entry stage by technicians
Color coding format for MLC patients
No provisional bone marrow and HIV positive report to be shown in wards
Rejected samples information is shown in Wards & they acknowledge it so that Laboratory Department is able to understand that information have been communicated
Critical alert through SMS is sent
Barcoded Patient Lab Reports.

SMS Module

Systems Triggers SMS at various events (Admission, Discharge, Registration, Billing, Appointments etc.) and also all important Daily MIS data sent on SMS to Management.

OTHER

Separate Module for Day Care Surgery Unit
Operation Theater Complex Work Flow
BOT Integration
Patient Eligibility Interface

MEDICAL IOT:

Medical IoT devices and applications, such as sensors and apps for remote healthcare and real-time patient monitoring, advanced and rapid diagnostics, and much more, are specifically designed for healthcare needs and settings. Medical IoT also makes use of AI and machine learning to support life-changing advancements in traditional medical care. Through improved automation, safety, and other technological gains, medical IoT offers new opportunities to improve patient care and manage the inherent complexity of the healthcare business.

Empower doctors to effectively track their patients' health and make data-driven treatment decisions by providing them with the tools they need. Any hospital environment can be highly optimized with IoT medical devices.

Remote patient monitoring:

Remote monitoring of a patient's vitals is possible with IoT medical devices, which can help doctors better respond to any emergencies with alert mechanisms, which is especially useful for the elderly.

Error-free diagnosis:

Doctors can identify the most optimal treatment for patients using data augmented from various medical devices and then presented together, reducing errors in diagnosis and subsequent treatment.

Kiosks & display systems

The hospital environment can be made more productive by real-time tracking of staff locations via display systems, as well as live updates on the status of various processes.

Augmented data from medical devices:

Whether it's for diagnosis or drug and equipment inventory management, all of the data collected from interconnected devices serves as the foundation for making efficient decisions in a hospital setting.

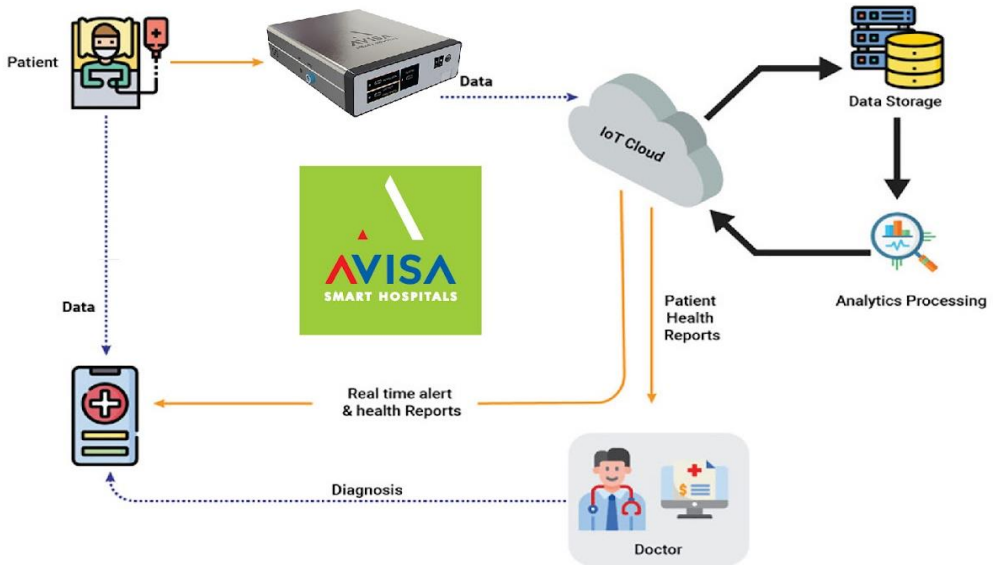

Fig. 5.1

E- PRESCRIPTION:

EMR is combined with the ease of writing with a pen and paper.Paper prescriptions are now digitally transmitted to the patient's EMR and HIS, as well as to the labs and pharmacies for processing.Adequate record keeping, in today's era of modern medicine, not only serves as a defense for the physician, but also as a tool for communication with fellow practitioners and future reference.

- India’s Leading handwritten Rx platform
- Enables patient Rx record’s e-storage forlife
- An excellent way to empower andeducate your patients
- Connects patients and healthcarepartners

Home Care-

Any professional support services that assist a person with any disease or condition, recovery from a medical condition, or elderly patients who require constant care at home are considered home care. Depending on a person's needs, professional caregivers such as nurses, aides, and therapists provide short-term or long-term care in the home.

- Long term & short term nursing services

- Elderly care
- Rehabilitation services
- Physiotherapy
- Mother & Infant care
- Home based critical care
- Palliative care
- Medical equipment’s

CONNECTIVITY VIA APP:

Smart Infrastructure brings an Enhancement to the Hospitals with Smart TechnologyImplementation and Bring process Automation with patient Monitoring System, for better patient &hospital experience withautomated systems.Primarily concerned on Hospital’s growth, bringing highlevel patient retention and engagement process, optimizing patient bounce rates and revenue leakage with its data driven solutions and digitization of Hospital Infrastructure.Patient , Hospitals , Clinics and Doctors are 360 degree connected with complete automationwhich brings a clarity on the operations and avoid gaps in executions where the Hospitals works in a structured Environment.

DEDICATED DOCTOR MOBILE APP-

Dedicated Mobile app for doctors to monitor appointments, view reports, Admission & Discharge summary, History etc. for an organized data handling.

AI BASED SMART PATIENT MOBILE APP- A web based patient portal with the ability for thePatients to view the following:

* Auto Registration * Access & Store Digital Lab reports

* Book Online Doctor Appointments * Track Doctor Appointment

* Vaccination Reports * Discharge Summary

* Patient Demographics * Access & Store Digital Lab reports

* Book Beds and Get Admission Booking*SMS and Mail Integration

* Feedback & Review system * Patient education/awareness

* Electronic Health Record

TELEMEDICINE:

Next-generation telemedicine, telemonitoring and homehealth to provide immediate access to licensed doctors and wellnessexperts via voice/video calls, live chat as well as on-site doctor visits andclinics for healthy, acute, and chronic condition management.

Electronic Medical Records:

This assists Healthcare units in establishing an appropriate communication, related to the data of patients, amongst the professionals. When performing an electronic medical record)EMR (, persistent information may include a period that is included in different health care procedures. It helps distinguish people who are expected to have tests or preventive tests, and to show how each patient meets their specific needs, such as: immunizations and pulse measurements. The goal of EMR is to enable provision of effective and accurate reviews.

Automated Customer Care Support:

Dedicated 24/7 customer care for your hospital for follow-up, support and feedback. This is provided to reduce the bounce rate or lapse of patients and will be available for every service required for the patient.

Chapter 6

OPD & IPD

Intervention of smart hospital in areas:-

- Securing payment from patients before their appointment. No manual collections at the front desk.
- Avisa platform automatically prompts patients to pay using a tablet/mobile/app scanner during check-in.
- Pre-appointment efficiency provided in hospital as well as in app reducing patient waiting time.
- Automating patient communications.
- More online physicians and other specialists available online on Avisa portal/app.
- Enhanced presence of web presence through optimized web profiles and technology specific to Avisa healthcare services.
- Automated registration and tracking appointments possible.
- Software installation in smart hospital with IT support.
- Length of service time in field and add service room (observation room, inspection room, etc) and facility.
- The average service time according to operational standards.

Out Patient Department

- Online registration for OPD
- Digital Pen used for electronic prescription. Doctor must have e- prescription tool provided by Avisa.
- Prescription get auto uploaded to patient profile and HIS. OPD slip must be saved in Avisa app for further refer of patient and doctor. Slip will be provided in hard copy also.
- Number of daily visits reports
- QR code present on OPD registration
- Pharmacy issuing any variant salts tracked for individual attention.

-Nursing services in IPD-

- Mini Lab by Avisa to be present on nursing counter
- Nursing care of patient.

CHAPTER 7

CHALLENGES & LIMITATIONS

Challenge 1: Computing in a Contextual Environment

Context is important in the development of smart hospitals because it is any information that can be used to characterize the situation of entities (people, places, objects) that are thought to be relevant to the interaction between an end user and a ubiquitous computing application. How can users form an accurate model of a constantly evolving digital world if context is constantly and ubiquitously redefined? How do we avoid disruption in human activities if system adaptation is negotiated? A clear architecture and a solid foundation,the explicit relationship between environment and adaptation is critical; in fact, it is the key that will unlock global context-aware computing. Improving the user experience is not enough; we need concepts, frameworks, and methods that will allow it to consider humans and computers as part of our complex world full of limitations and opportunities.

Challenge 2: Cognitive Computing

Cognitive computing (cc) is well-suited to solving medical problems because it focuses on how to deal with complex situations and information uncertainty. In biomedical informatics, dealing with speculative data is the biggest challenge.Exploration of both hyper-dimensional data representation and randomness is a major challenge in cognitive computing.

Challenge 3: Beyond Data Mining

Smart health has the potential to empower more people to take control of their health and, as a result, become more aware and informed. It does, however, raise a slew of ethical concerns. Who owns the health information gathered? Who wants to share their medical information? What happens to the new influxes of health data? When designing a smart hospital, all of these factors must be taken into account.

LIMITATIONS:

1. Patients' apprehension about technology:In terms of hardware, the use of the internet, mobile phones, and smartphones is on the rise. Artificial narrow intelligence, robotics, genomics, telemedicine, virtual and augmented reality, and other medical technologies are becoming disruptive.
2. A novel market concept: Changes in providing care and practicing medicine were prompted by a new phenomenon we call "digital health," which we define as "the cultural transformation of how disruptive technologies that provide digital and objective data accessible to both caregivers and patients leads to an equal level doctor-patient relationship with shared decision-making and the democratization of care."
3. After proper training, hospital staff and doctors is not user friendly with smart devices.
4. A smart hospital can't be properly implemented if the hospital's infrastructure isn't up to par: Patients have been entirely reliant on healthcare providers' and systems' processes, infrastructure, information, and decisions. Patient empowerment, which included the use of disruptive technologies that were also becoming available, was primarily motivated by insecurity and exposure to decisions beyond their control.
5. Additional manpower was required for the evaluation and maintenance of smart devices in the hospital, as well as additional smart device training for hospital staff.
6. Integration problems: Many new smart hospital devices require their own app that may or may not integrate with various routers, smart hubs and other systems in the hospital.
7. Device configuration: The configuration of smart devices should be very user-friendly. Many devices, however, still require manual intervention. In this situation, the need for AI-based configuration is obvious in order to ensure that devices are set up quickly and effectively.
8. A lack of signaling or bidirectional communication between devices for collection and routing purposes is one of the issues.

CHAPTER 8

RESULTS

- ✓ There is a positive impact on patients because the time taken to discharge,ipd,opd, lab is reduced from 45 minutes to 20 minutes.
- ✓ Pt. satisfaction has increased– more than 60% because equipping the healthcare space with smart infrastructure, interconnected management systems, software installations, patient health cards, and cutting-edge equipment as part of this transformation. We are enabling a quantitative leap in the experience patients have within hospitals and beyond by putting patient-centric care at the forefront of our smart solutions and smart hospital features other than our provision of medical health cards.
- ✓ As all devices are integrated with HIS, staff work is reduced: - extend high-quality care while lowering costs, improving operations, and streamlining management.
- ✓ There is no revenue leakage because all departments have all been connected and case linked to HIS. - easy patient monitoring
- ✓ Doc pen is easy for doctor- as it brings EMR with comfort of writing with pen & paper. Paper prescriptions go live digitally to the patient EMR & the HIS, also relaying the same to the Labs & Pharmacies to act upon.
- ✓ Increased efficiency and accuracy for rapid diagnosis with smart POCT solution-portable monitoring system, which can conduct 30 major tests instantly, enabling the doctor to screen the patients and recommend for further treatment immediately. The report is generated digitally and gets saved automatically in patient app and the consulting doctor app as well as masking into the HIMS. Remote patient monitoring is vital for chronic disease management or any specific disease or condition.
- ✓ Continued home care with remote patient monitoring helps the patient to monitor and observe his conditions.
- ✓ Real-time data can be shared with the doctors through telemedicine ensuring efficient treatment and quality care.

CHAPTER 9-

CONCLUSION&RECOMMENDATION

Patients are increasingly expecting seamless digital interactions as well as a healthcare experience that is as innovative and advanced as that of other service industries. Thanks to recent technological advancements and an explosion of non-urgent care options, healthcare consumers are more empowered than ever before to find healthcare organizations that meet (or exceed) their expectations—and to help others avoid making the same mistake (e.g., telemedicine, minute clinics, and other walk-in services).The overall sentiment of online reviews is weighed against the volume of each company by healthcare consumers. 80 percent of survey participants require five or more positive reviews before deeming a provider trustworthy. According to Press Ganey, a healthcare experience leader, 66 percent of 1,000 respondents believe these brands could pose a significant threat to traditional hospitals and provider institutions that aren't modernizing their operations.Medical practice has become increasingly reliant on health information technology. Health IT, like any new technology, has both potential advantages and disadvantages. To date, the research has been limited to single sites or institutions. National estimates have been derived from extrapolations from these single-site studies. It's critical to keep patient safety and quality in mind as the adoption and use of health IT systems grows.

Recommendation-

A comprehensive audit of hospital systems and processes is something I strongly recommend. Utilize existing and emerging technologies to make on-time appointments a priority. Build your processes around patients instead of the other way around, streamline appointment workflows, and make sure everyone is in and out as quickly as possible. Allow patients to submit medical forms ahead of time using digital check-in services. Allow customers to book and reschedule appointments online with ease. Telehealth/telemedicine and other virtual care services should be integrated.Utilize physician assistants (PAs) and nurse practitioners (NPs) for routine or non-urgent visits to stay on schedule.

To improve efficiencies and productivity, create better new patient lead workflows. Organize patient surveys. Send appointment reminders to patients to reduce the number of no-shows (which can keep everyone waiting unnecessarily). Make a policy for cancellations, no-shows, and late arrivals and make it public. For example, fees for same-day appointment cancellations, no-shows, late arrivals, and late-notice rescheduling may be outlined in this policy.Automate appointment re-filling by improving access management practices. If you have a cancellation or reschedule, for example, call patients who have an appointment later and offer them an earlier appointment. This keeps your queue full, reduces revenue loss, and allows other patients to schedule earlier appointments. Identify and resolve bottlenecks as soon as possible. Streamline internal communications and processes. To keep patients out of the reception area, use a mobile or virtual queue. Make the waiting area warm and inviting.

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