Summer Training at
Max Super Speciality Hospital,
Mohali

Audit on Diabetes Management of Indoor Patients in Max Hospital

By
Sheenam Nijhawan

Under the guidance of
Dr. Barun Kajilal

MBA Hospital and Health Management
2015-2017

The IIHMR University, Jaipur
2016

INSTITUTE OF HEALTH
MANAGEMENT RESEARCH
(WHO Collaborating Centre for District Health System Based on Primary Health Care)

IIHMR UNIVERSITY

TO WHOMSOEVER IT MAY CONCERN

This is to certify that, **Dr. Sheenam Nijhawan** student of MBA in Hospital and Health Management from The IIHMR University, Jaipur has undergone summer training at **Max Super Speciality Hospital, Mohali** from **1st April 2016** to **31st May 2016.**

The candidate has successfully carried out the study designated to her during summer training and her approach to the study has been sincere, scientific and analytical.

The summer training is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.

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Ref:MOH/TR/CP/J134

May 31st, 2016

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr.Sheenam Nijhawan D/o Mr.Surinder Nijhawan** has completed her training in the department of **Quality & Medical Services** at Max Super Speciality Hospital, Mohali on 31st May 2016.

The project undertaken by her during the training period was "Audit on diabetes management of indoor patients in a tertiary hospital".

She possesses a keen observation & conducts herself with confidence.

During her training (April 01st 2016 to May 31st 2016) she was part of hospital set up & was reporting to Dr. Manpreet Kaur Sahi (AMS-Medical Services).

We wish her all the best in her future endeavours.

For Max Super Speciality Hospital

Lily Sahota

Lily Sahota
AGM-Human Resources

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I would also like to give my sincere gratitude to Ms.Hema Sharma (Assistant MRO) for providing medical records of patients included in the study.

My sincere thanks to Dr. Barun Kanjilal (Professor, IIHMR University) for giving me an opportunity to work as a summer trainee in Max Super Speciality Hospital, Mohali and for the support and encouragement in the completion of the project.

Contents

List of Abbreviations/Acronyms used in the Report 8

About Max Super Speciality Hospital, Mohali 10

History of Max Hospitals 11

Section 1 Vision and Mission 12

1.1 Objectives 13

1.2 The Logo 13

2 Max Super Speciality Hospital, Mohali 14

2.1 Introduction 14

2.2 Facts & Figures 14

2.3 Awards & Certifications 15

2.4 Collaboration: 15

2.5 Number of Departments 16

2.5.1 Clinical Departments: 16

2.5.2 Clinical Facilities: 16

2.5.3 Non-Clinical Departments: 16

2.5.4 Outsourced staff 18

2.5.5 Services Provided 18

2.5.6 Figures about Max Hospital 18

2.6 Handling Visitors 20

2.7 Out Patient Department 20

2.7.1 Handling Appointments 21

2.7.2 Walk In Appointments 21

2.7.3 Registration Form 23

2.7.4 OPD Patient Registration, Consultation, Diagnostic and Treatment Process 24

2.8 IPD Working 25

2.8.1 Admission Procedure 26

2.8.2 Admission Process Map 27

2.8.3 Admission Request Form 28

2.9 Observational Analysis 29
2.9.1 Positive Features 29
2.9.2 Limitations 29
2.9.3 Suggestions 30
2.9.4 Conclusion 30
An Audit On Diabetes Management of Indoor Patients in MAX Hospital 32
INTRODUCTION 32
Section 1 AIM OF THE STUDY 33
1.1 RATIONALE 33
1.2 RESEARCH QUESTION 33
1.3 OBJECTIVES 33
Section 2 METHODS 34
2.1 Study area 34
2.2 Sample design 34
2.3 Sample size 34
2.4 Sampling Technique 34
Section 3 DATA COLLECTION 35
3.1 Data Compilation 35
3.2 Data management 36
3.3 Outcome measures 36
Section 4 Findings and Discussion 36
Patient and hospitalisation characteristics: 36
Inpatient Treatment: 39
Criteria 1: To evaluate practicing Pre & Post prandial blood glucose monitoring: 41
Criteria 2: Recording of HbA1c during admission (if previous 3 month's value is not available). 43
Criteria 3: Documentation of blood glucose at the time of admission and discharge. 44
Criteria 4: Diet management during hospital stay and instructions at the time of discharge: 45
Criteria 5: Strict guidelines of endocrinologist's consultation. (Figure 3) 46
Criteria 6: Follow up of patients after discharge: 47
DISCUSSION 48
LIMITATIONS 50
Section 4.01 RECOMMENDATIONS 50
Section 4.02 CONCLUSION 51
REFERENCES 52

ANNEXURES 53

(a) Data Collection Format 53

Table of Figures

Figure 1. Vision and Mission of Max Hospital, Mohali 12
Figure 2. Objectives of Max Hospital, Mohali 13
Figure 3. Logo of Max Healthcare 13
Figure 4. Logo of NABH 15
Figure 5. Logo of NABL 15
Figure 6. Logo of LEED Certified Green Hospital by IGBC 15
Figure 7. Various Specialities Provided by Max Hospital, Mohali 18
Figure 8. Flow chart of Handling Visitors 20
Figure 9. Flow Chart of Handling Appointments 21
Figure 10. Flow Chart of Walk In Appointment 22
Figure 11. Patient Registration Form 23
Figure 12. Admission Process Map 27
Figure 13. Admission Request Form 28
. *Figure 14. In-hospital treatment regimens among patients with hyperglycemia* 41
Figure 15. Glucose monitoring schedule of diabetic inpatients 43
Figure 16. Number of patients who received endocrinologist consultation during hospital stay 47

List of Abbreviations/Acronyms used in the Report

ACE: American College of Endocrinology

ADA: American Diabetes Association

BG: Blood Glucose

DKA: Diabetic Ketoacidosis

IV: Intravenous

LOS: Length of Stay

MNT: Medical Nutrition Therapy

NPH: Neutral Protamine Hagedorn

NPO: Nil Per Oral

OHAs: Oral Hypoglycemic Agents

POC: Point of Care

RBS: Random Blood Sugar

SD: Standard Deviation

About Max Super Speciality Hospital, Mohali

History of Max Hospitals

Max Healthcare Institute is a healthcare institute based in New Delhi, India. The Institute is a wholly owned subsidiary company of Max India Limited. Established in 1985, Max India Limited is a Public Limited company listed in the Bombay Stock Exchange and National Stock Exchange of India with more than 37,000 shareholders.

The institute operates eleven centres in Delhi, NCR and neighbouring Punjab region, providing health care services in more than 30 disciplines. The company provides patient services including nuclear medicine and cardiac imaging, labs, scans, interventional cardiology, cardiacpacing and electrophysiology, neurosciences, orthopedics, gynecology and obstetrics, pediatrics, cancer care, kidney transplant, bone marrow transplant, maternity services, diagnostic services, paediatric, neurophthalmology, internal medicine, general surgery, urology, nephrology, gastroenterology, mental health and behavioural sciences, rehabilitative services, and pulmonology.

Mr. Analjit Singh is the Founder & Chairman Emeritus of Max India Limited, Chairman of Max Life Insurance Company Limited, Max Healthcare Institute Limited and Max Bupa Health Insurance Company Limited.

With over 2600 beds and 13 top hospitals in Delhi-NCR, Punjab and Uttarakhand, 2300 world-class doctors, Max Healthcare is one of the leading chain of hospitals in India. With over 500 ICU beds, the most advanced technology and state-of-the-art infrastructure, Max Healthcare is one of the best hospitals in India.

Max healthcare is committed in meeting all healthcare needs of customers, starting from the maintenance of good health to providing global standards in diagnostics, therapeutics and surgical requirements at the time of need.

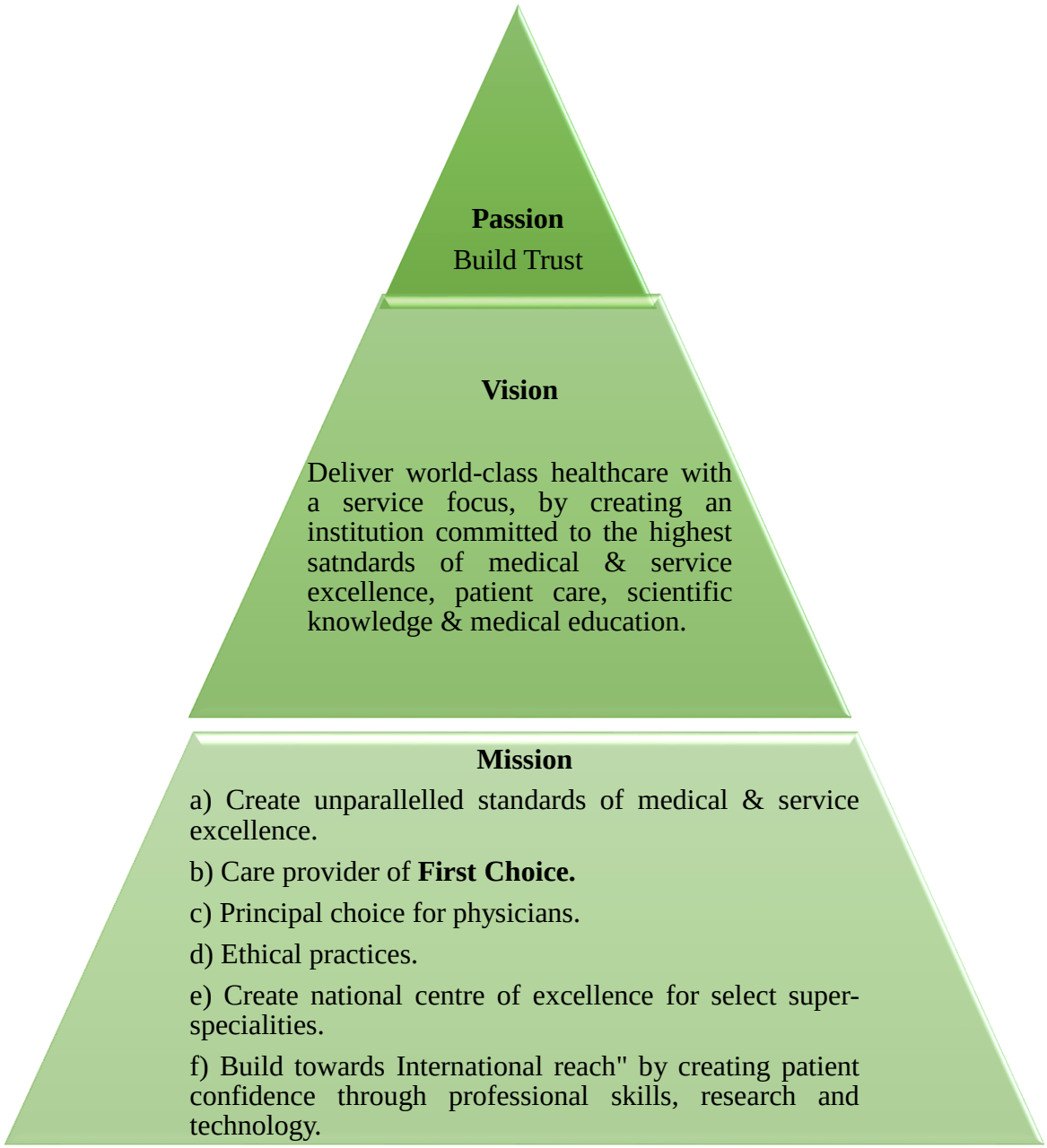
It aims to exceed customer's expectations in terms of quality, service, safety and value for money through constant innovation and better product delivery.

Performance, Trust and Service excellence are enshrined in Max India Group's Vision, Mission and Values. In addition to these "life-centred' businesses, Max India manufactures speciality products for the packaging industry through its division- Max Speciality Products (MSP). MSP too has a strong service excellence orientation that strives on building long lasting partnerships.

The institutes focus is "completely satisfying customer needs profitably" by using DMAIC and Lean methodology.

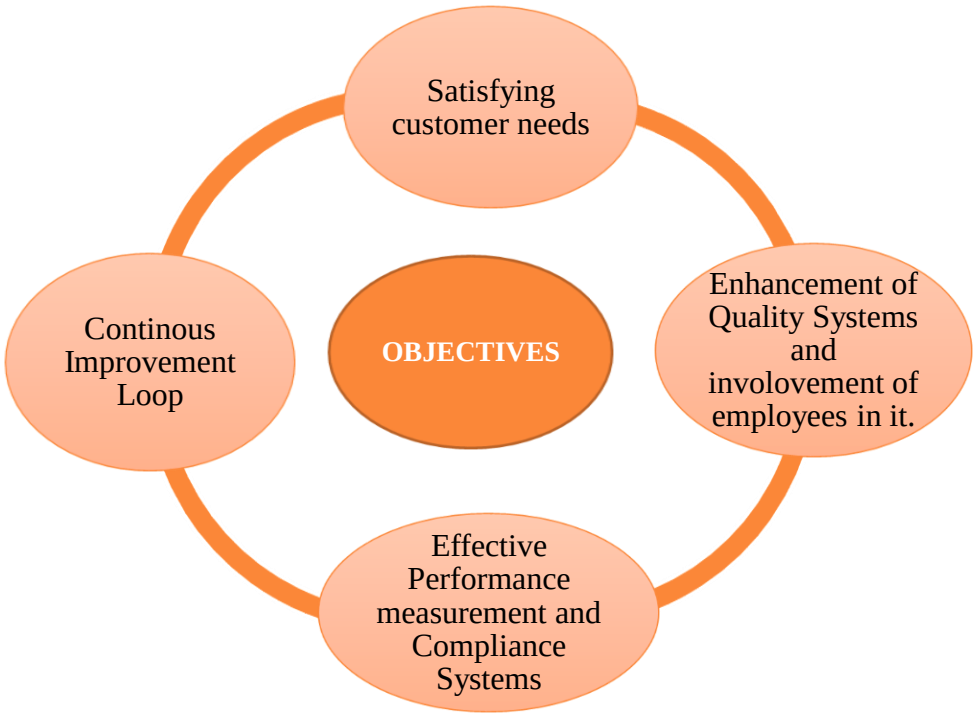
Section 1 Vision and Mission

Figure 1. Vision and Mission of Max Hospital, Mohali



1.1 Objectives

Figure 2. Objectives of Max Hospital, Mohali



1.2 The Logo

Figure 3. Logo of Max Healthcare

The cross is the accepted symbol for Healthcare all over the world. It is a truly suitable symbol for a group that endeavours to enhance the quality of life through healing and care. The healthcare green is fresh, close to nature and symbol of life.

1 Max Super Speciality Hospital, Mohali

1.1 Introduction

Max Super Speciality Hospital, Mohali is another milestone towards realizing the dream of great visionary Mr. Analjit Singh, chairman and managing director of Max Healthcare Ltd.

The 217-bedded super speciality hospital is known for its personalised service and dedicated care for its patients.

Max Super Speciality Hospital, Mohali aims to bring comfort and convenience to its patients.

They believe in understanding their patients' health related problems and offer the right treatment to them. The hospital specializes in offering a broad array of services and amenities like Blood Bank, 24*7 Pharmacy for our-patients.

They use the most technologically advanced medical equipment to achieve excellence in research and treatment. They also have an art of diagnosis system to understand health problems better and choose the right treatment for their patients.

The state-of-the-art hospital extends dedicated care and personalised service to its patients: a pool of committed doctors and support staff help patients to get back to their normal routine at the earliest.

1.2 Facts & Figures

- Name: Max Super Speciality Hospital
- Location: Phase 6, Mohali (Punjab)
- Speciality: Tertiary Care Super Speciality Hospital
- Number of Beds: 217

Important dates:

- **September 2011**- OPD was inaugurated by honourable chief minister of Punjab Sh. Prakash Singh Badal.
- **December 2011**- IPD was inaugurated.

Research Activities

- Disease Management Programmes
- Health Promotion and Counselling Services

2.3 Awards & Certifications

Max Super Speciality Hospital has been endowed with multiple certifications assuring the highest level of medical and service quality.

Figure 4. Logo of NABH

NABH Accreditation: The accreditation is a recognition of Max Healthcare's commitment to provide the highest quality of care to its patients.

Figure 5. Logo of NABL

NABL Accreditation: Max Healthcare laboratories have successfully obtained NABL accreditation in the field of medical testing.

Figure 6. Logo of LEED Certified Green Hospital by IGBC

They are **LEED certificate Green Hospital** - Four out of Six* such hospitals in India are Max Hospitals.

2.4 Collaboration:

Max healthcare and GE healthcare have joined hands to advance Cancer care in India through research and Co-creation of multifaceted cancer care solutions.

Collaboration between Max Planck Society: Germany and Department of Science and Technology, India to understand the role of Ubiquitin-related modifiers in regulation of RNA splicing.

2.5 Number of Departments

2.5.1 Clinical Departments:

- Infection control
- Central Sterile Services Department
- Physiotherapy
- Cardiothoracic & Vascular Surgery ICU
- Neonatal ICU
- Labour, Delivery and Recovery
- Operation Theatres
- Triage/Emergency
- High Dependency Units
- Radiology
- General ward
- Laboratories
- Medical ICU
- Cardiac Care Unit
- Catheterization Laboratory
- Dialysis

2.5.2 Clinical Facilities:

- Blood Bank
- Computerized Tomography (CT) Scan
- Electrocardiogram (ECG)
- Endoscopy
- Histopathology/Laboratory
- Imaging Services
- Magnetic Resonance Imaging (MRI)
- Radio Immuno Assay
- Sonography
- Integrated Hospital Information Systems
- Computerized Billing
- Documented Infection Control Policies/Manuals
- Other major equipment – Gamma Camera, Treadmill Stress Test (TMT)

2.5.3 Non-Clinical Departments:

- Reception/Helpdesk/Information Desk
- Cafeteria/ Canteen
- Insurance Desk
- Pharmacy inside the hospital
- Ambulance Service
- Bio- Medical Engineering
- Laundry Management

- Maintenance & Facilities Management like housekeeping etc.
- Management of Bio-medical waste
- Mortuary services
- 24 hours Security
- Social service
- Supply chain Management/ Material Management System
- Finance
- Human resource
- Medical records
- Quality assurance
- Research
- Patient welfare department
- Information technology

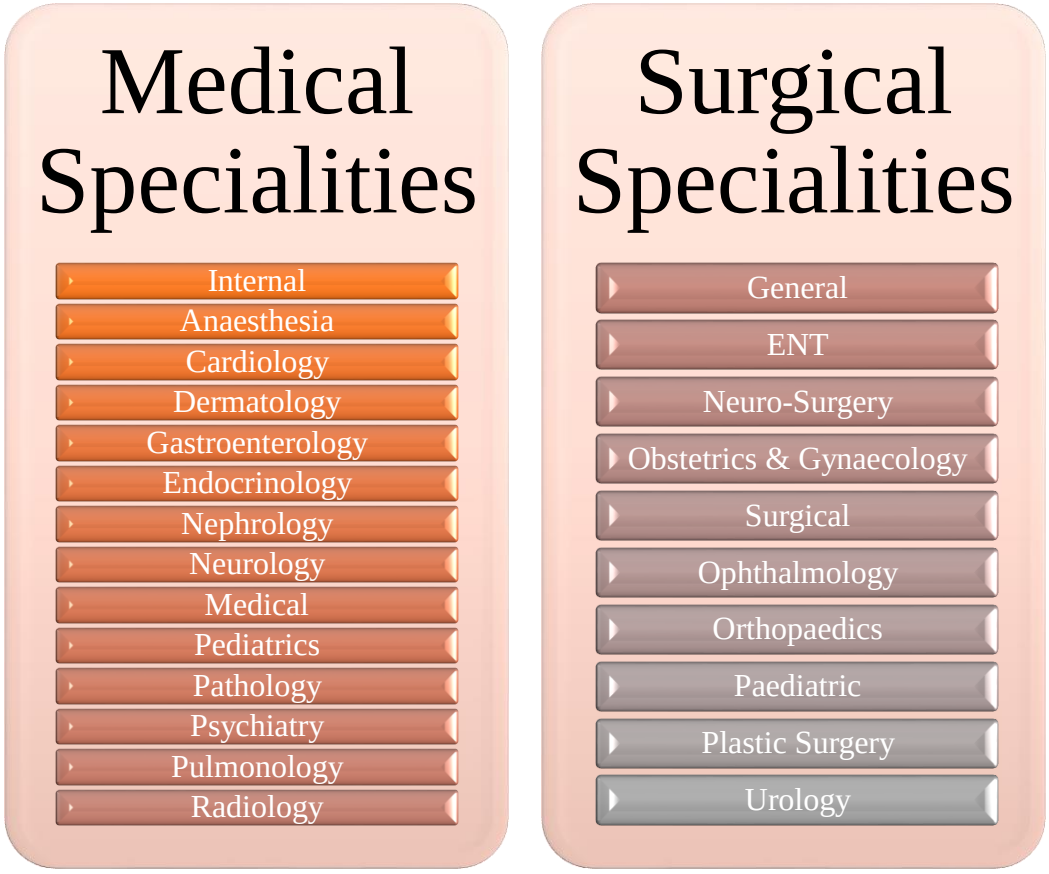
2.5.4 Outsourced staff

- Laundry- A-one, Maurya
- Food & Beverage- High Tech Hospitality
- House-keeping- Avon

2.5.5 Services Provided

Various medical and surgical specialities offered in the hospital are shown in shown in the figure below.

Figure 7. Various Specialities Provided by Max Hospital, Mohali



2.5.6 Figures about Max Hospital

Max hospital, Mohali is a 217 bedded hospital offering various medical and surgical care facilities in Punjab.

The table below shows the number of specialised wards and beds in each ward present in the hospital.

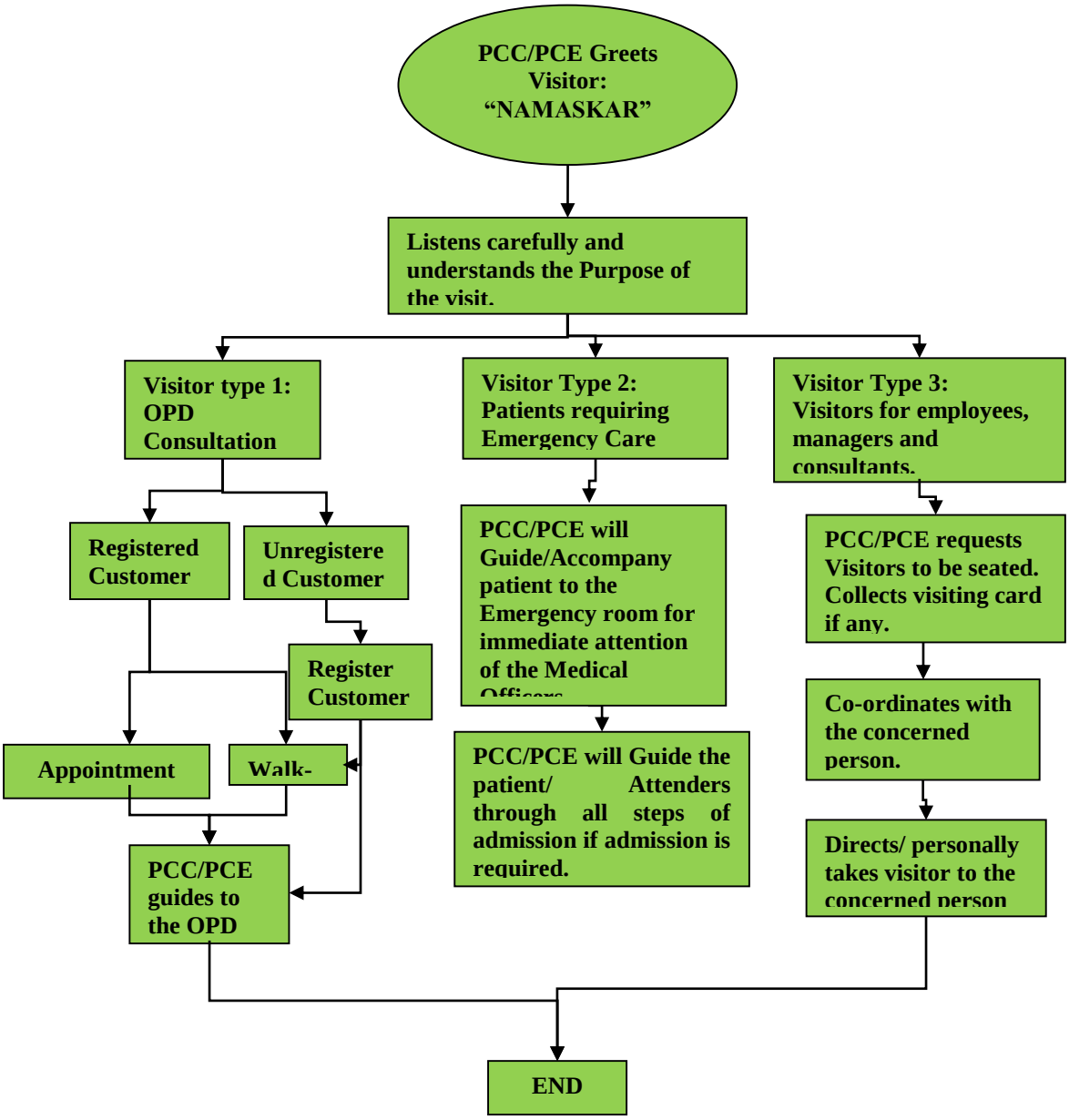
Table 1 Number of Special wards & functional beds

Total number of beds	217
Number of General wards/classes	133
Number of Special wards/classes	Oncology Day-care Ortho ward Emergency ward Gynaecology wards Dialysis ward Multi-speciality-Single room, Twin sharing, Economy
Number of functional beds in Special wards	MSP Economy-82 Single-28 Twin sharing-30 Dialysis-10 ER-6 Oncology Day-care-15
Total number of Operation Theatres (OT)	8
Number of Emergency Wards	6
Number of functional beds in Emergency wards	6
Number of ICU	10
Total number of beds in ICUs	84
Number of Labour rooms(only for Gynaecology & Obstetrics)	1
Number of NICUs	1
Number of Ambulances	3
Surgical Specialities	32
Number of minor OT's	0
Number of major OT's	8

2.6 Handling Visitors

Max hospital has a well-planned and organised way to attend the visitors according to their purpose of visit. They have 3 different counters for attending 3 types of visitors i.e. for OPD consultation, for emergency care & for employees, managers & consultants.

Figure 8. Flow chart of Handling Visitors



2.7 Out Patient Department

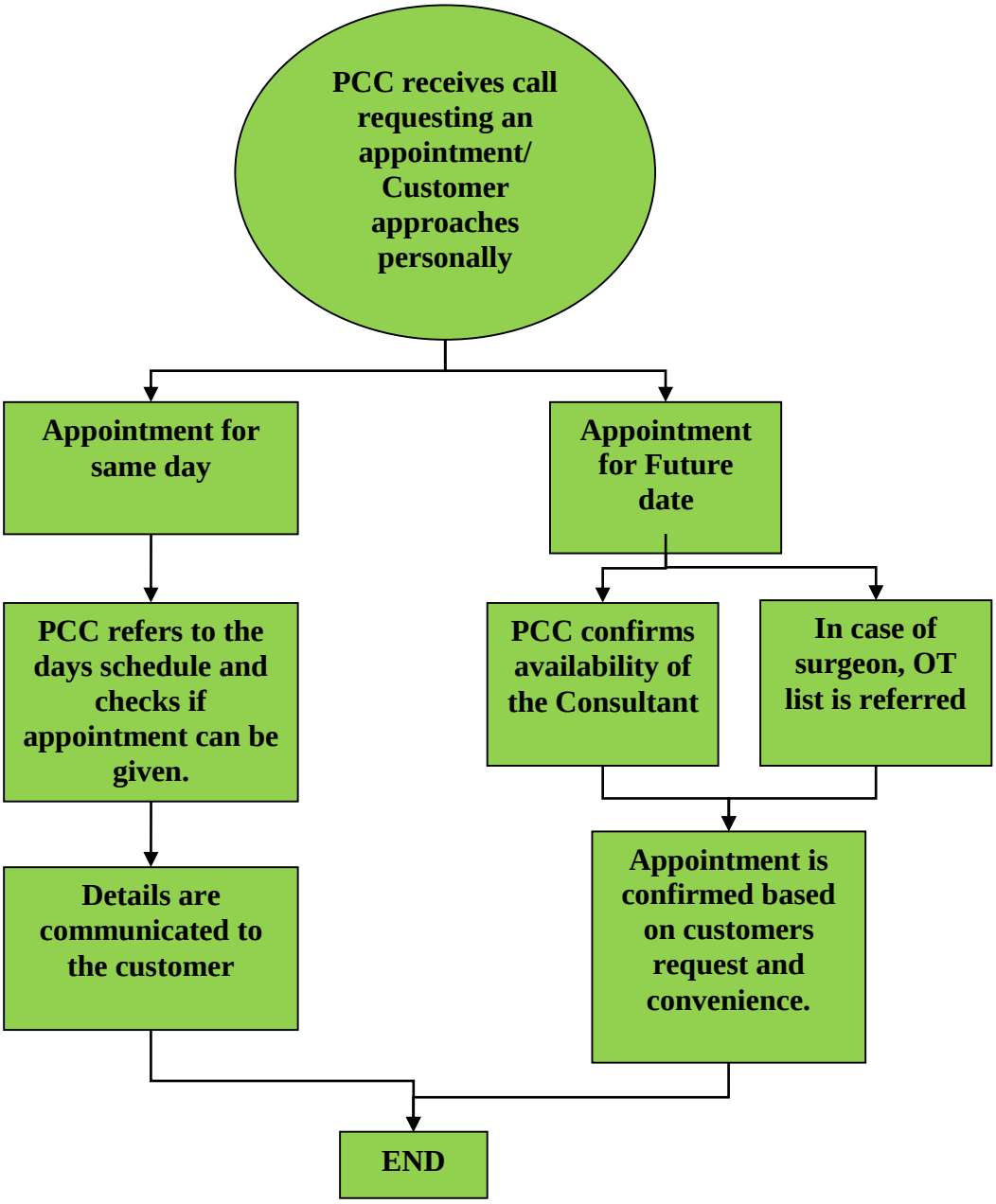
Outpatient department is a hospital department where healthcare professionals see outpatients, which consists of consulting rooms and support areas—e.g. nurses station,

treatment rooms and waiting rooms. Outpatient departments are often physically located near support services (e.g. X-ray, ECG, surgical appliance department, pharmacy etc.).

2.7.1 Handling Appointments

The process flow of handling patient appointments in the hospital is presented in the figure below.

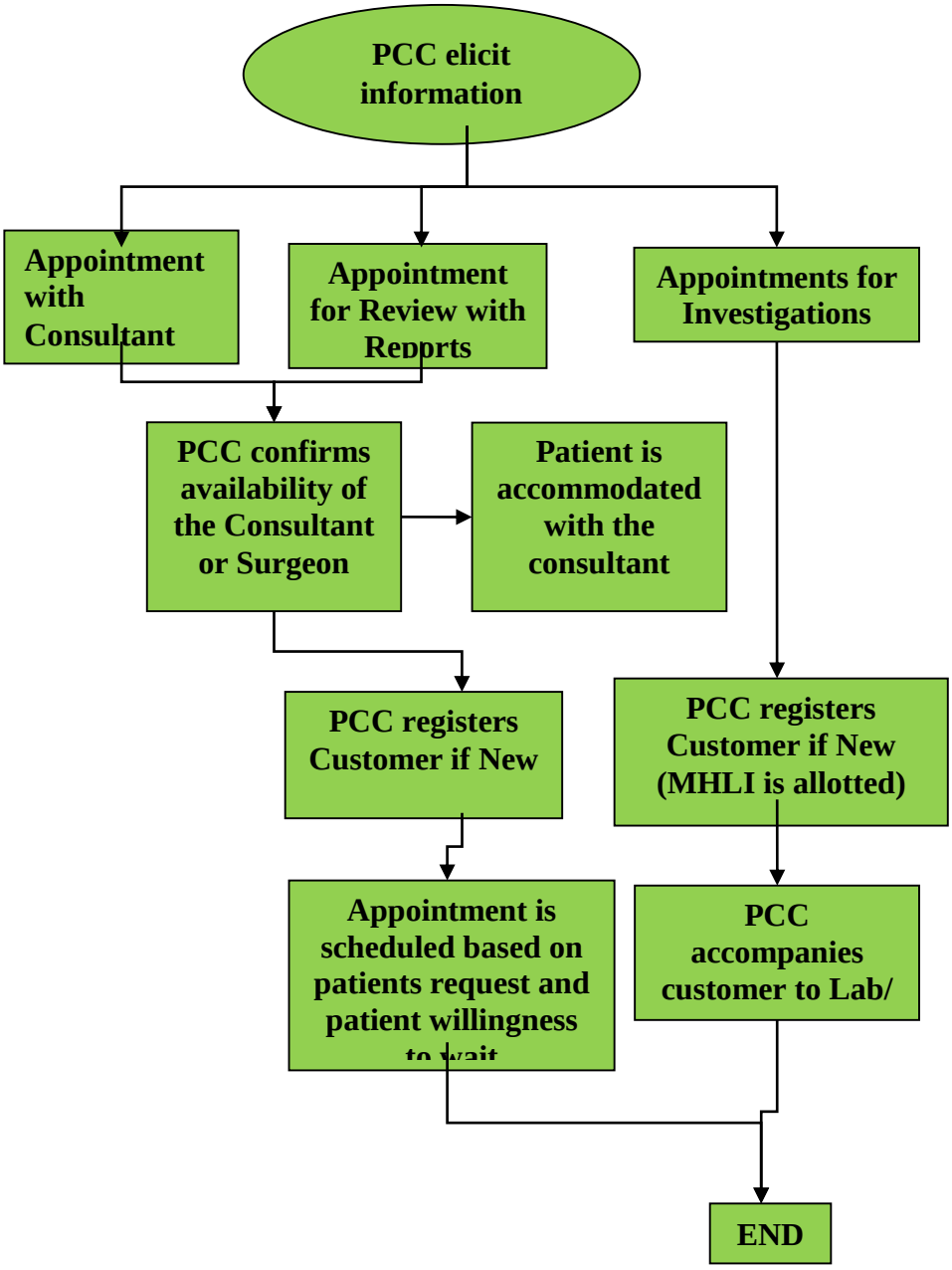
Figure 9. Flow Chart of Handling Appointments



2.7.2 Walk In Appointments

The walk in appointments are managed in the following way:

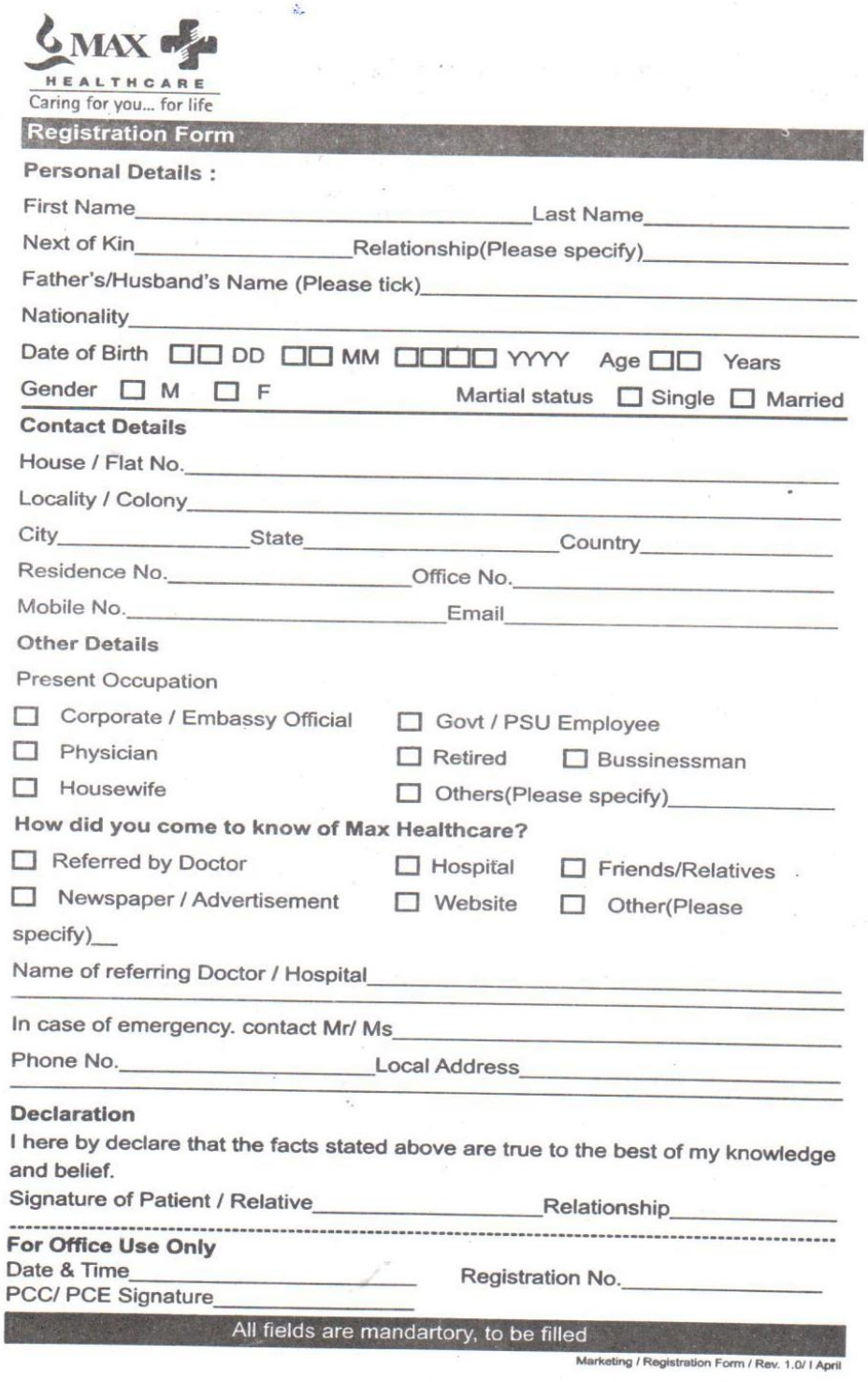
Figure 10. Flow Chart of Walk In Appointment



2.7.3 Registration Form

Given below is the registration form to be filled by a new visitor/patient in the hospital

Figure 11. Patient Registration Form



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Registration Form

Personal Details :

First Name_____Last Name_____

Next of Kin_____Relationship(Please specify)_____

Father's/Husband's Name (Please tick)_____

Nationality_____

Date of Birth ☐☐ DD ☐☐ MM ☐☐☐☐ YYYY Age ☐☐ Years

Gender ☐ M ☐ F Martial status ☐ Single ☐ Married

Contact Details

House / Flat No._____

Locality / Colony_____

City_____State_____Country_____

Residence No._____Office No._____

Mobile No._____Email_____

Other Details

Present Occupation

☐ Corporate / Embassy Official ☐ Govt / PSU Employee

☐ Physician ☐ Retired ☐ Bussinessman

☐ Housewife ☐ Others(Please specify)_____

How did you come to know of Max Healthcare?

☐ Referred by Doctor ☐ Hospital ☐ Friends/Relatives

☐ Newspaper / Advertisement ☐ Website ☐ Other(Please specify)__

Name of referring Doctor / Hospital_____

In case of emergency. contact Mr/ Ms_____

Phone No._____Local Address_____

Declaration

I here by declare that the facts stated above are true to the best of my knowledge and belief.

Signature of Patient / Relative_____Relationship_____

For Office Use Only

Date & Time_____ Registration No._____

PCC/ PCE Signature_____

All fields are mandartory, to be filled

Marketing / Registration Form / Rev. 1.0/ I April

2.7.4 OPD Patient Registration, Consultation, Diagnostic and Treatment Process

1. Setting up an appointment

- Patient Fixes OPD Consult or Diagnostics Appointment over phone / walk in.
- Appointment fixed in Appointment schedule / Equipment schedule
- Patient visits the facility and is guided to the OPD counter for Registration process by Helpdesk

2. Patient Registration & invoice generation

- Patient meets the PCE/PCC & fills the registration form or gives details if already registered.
- Patient Details entered in HIS
- Discount is given if patient is a senior citizen or from any corporate with which we have an arrangement
- Patient pays by Cash / Credit Card or Credit bill raised if corporate patient.
- Patient invoice generated (as per Standard Tariff list) with the Registration No. & service detail.
- If any wrong entry is made or test could not be conducted, refund voucher to be generated
- Manual invoice generated as per approved pricing policy in case HIS not working or if any new service or tariff introduced.
- The new service/ tariff is intimated to IT for incorporation into HIS
- Manual invoices are updated in HIS if incorporated in HIS same day.
- If tariff is not incorporated in HIS then approval from accounts taken to update the HIS whenever new service/ tariff incorporated in HIS and scrolls is signed by Duty Manager.
- At the End of shift, PCC/ PCE takes out cash scroll from HIS.

3. Patient Consult / Diagnosis & Treatment.

- Patient has been guided to the Nursing counter

  Nurse records patients' vitals followed by consultation with Doctor.

4. Patient visits Labs/ Pharmacy

- Patient visits various Diagnostic dept. and tests are conducted in Labs and is informed about the date of collecting the Report

  Patient visits pharmacy if Drugs prescribed by doctor.

5. Review Consultation appointment made

- Patient contacts PCC/PCE at OPD counter for fixing review appointment date.

  In case report not available, generate daily pending report list and follow up.

2.8 IPD Working

ADMISSION & DISCHARGE DESK			
GROUND FLOOR (TWO DESKS)	ONCO DAY CARE	MAX ELITE	SECOND FLOOR (TWO DESKS)

Inpatient services are hospital services and items furnished to inpatients including beds, nursing, diagnostic, therapeutic, medical and surgical services.

2.8.1 Admission Procedure

Pre Admission Investigation Process

- Patient approaches IP desk with admission request form issued by the doctor
- Patient details entered in HIS, advance collected and Estimation is provided to the patient.
- Advance receipt & Pre admission no generated
- Patient is told about the reporting time and entry is made in Expected Admission register

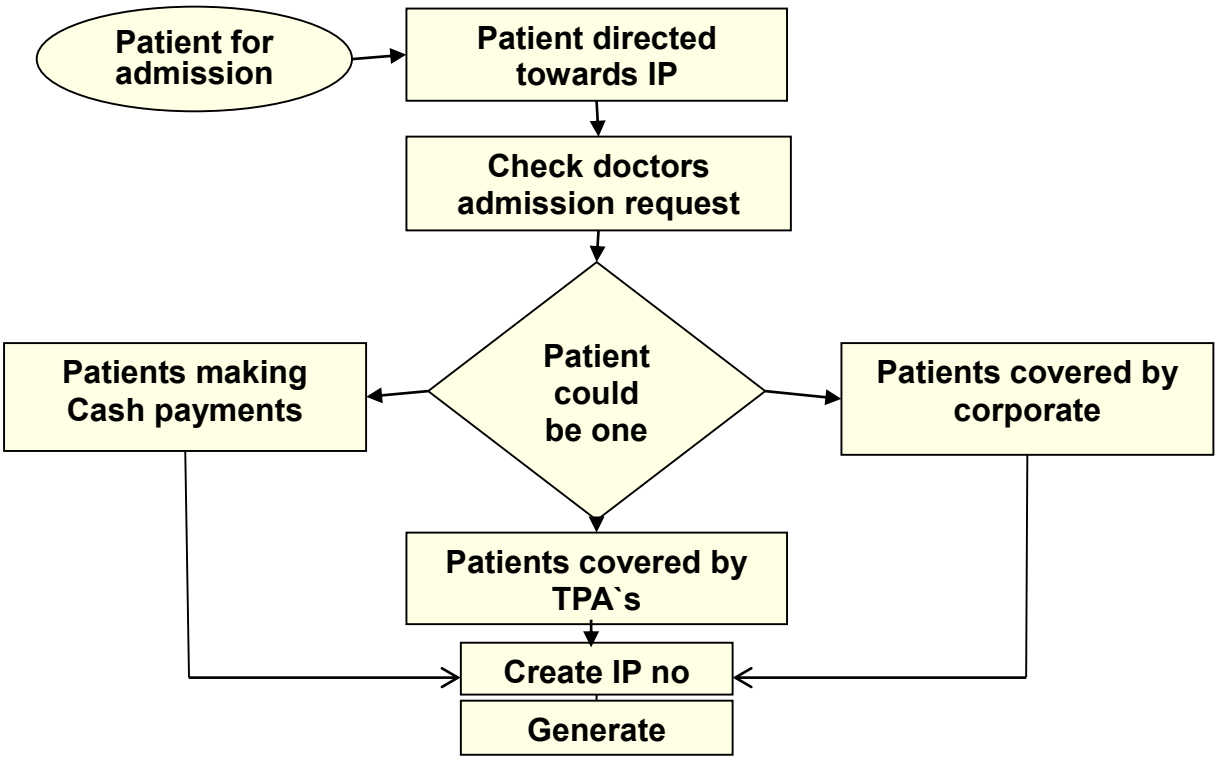
Patient Admission Process

- Patient informed about the charges and other essential details like Estimated Expense, inpatient Information, etc. required during the stay.
- Availability of room is checked from the Bed manager.
- Patient details entered in HIS and face sheet generated
- Advance amount taken from the patient by cash / credit card / as per the estimated cost
- For TPA patient pre authorization form is given to be filled up by the patient and the doctor (see insurance process) and signature is taken on in patient Information Sheet for TPA Hospital Policy.
- Passes are issued to the patient as per visitor policy and entry made on Face Sheet (Office Copy).
- Patient folder is created & sent to the wards along with a Front Office Staff / GDA.
  For any International patient International Patient Services are informed

2.8.2 Admission Process Map

The figure below shows the steps and procedure of patient admission in Max hospital.

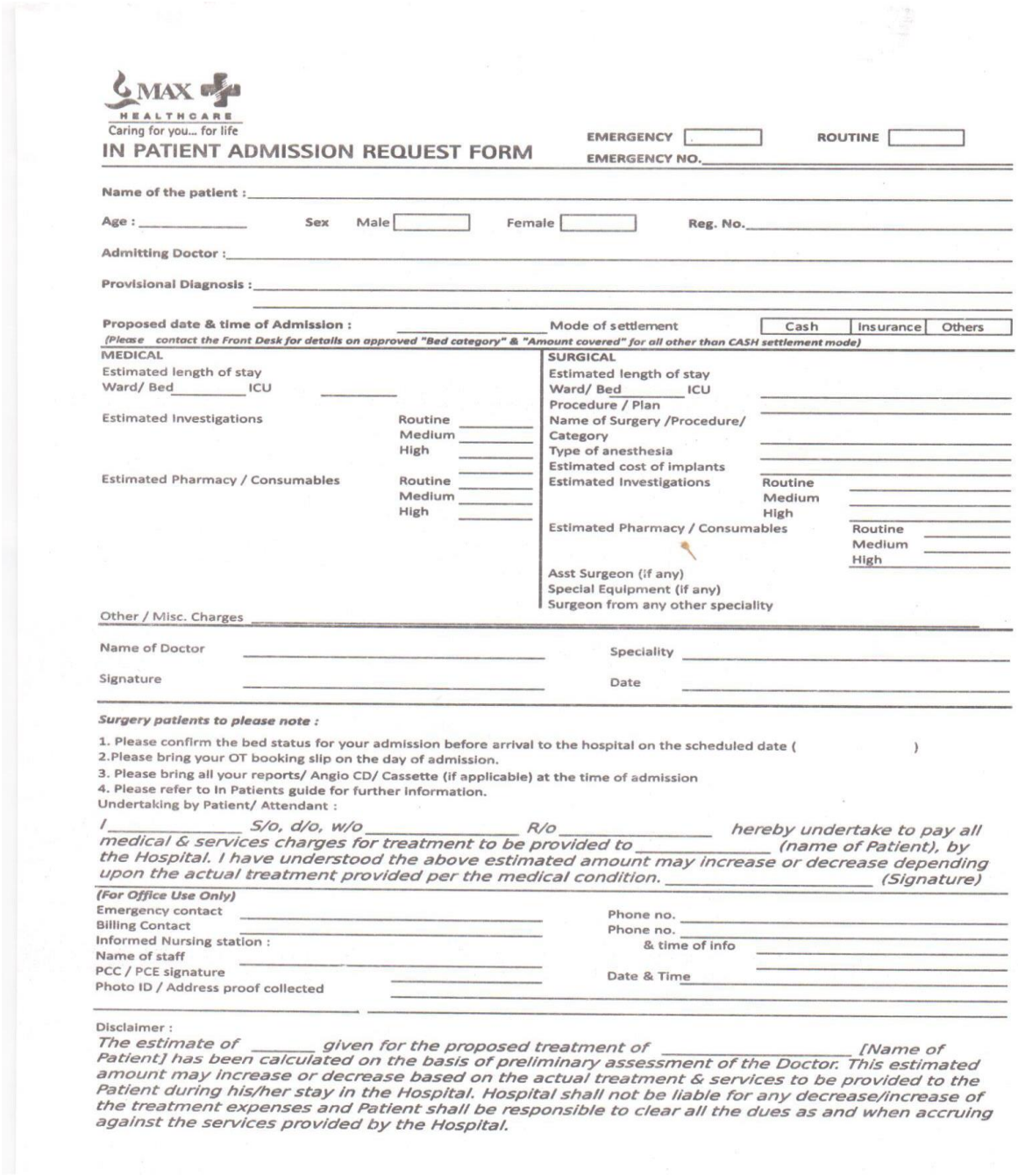
Figure 12. Admission Process Map



2.8.3 Admission Request Form

Given below is the admission request form of Max Hospital.

Figure 13. Admission Request Form



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IN PATIENT ADMISSION REQUEST FORM

EMERGENCY [ ] ROUTINE [ ]
EMERGENCY NO._____

Name of the patient :_____

Age :_____ Sex Male [ ] Female [ ] Reg. No._____

Admitting Doctor :_____

Provisional Diagnosis :_____

Proposed date & time of Admission :_____ Mode of settlement | Cash | Insurance | Others |

(Please contact the Front Desk for details on approved "Bed category" & "Amount covered" for all other than CASH settlement mode)

MEDICAL

Estimated length of stay
Ward/ Bed_____ ICU _____

Estimated Investigations
Routine _____
Medium _____
High _____

Estimated Pharmacy / Consumables
Routine _____
Medium _____
High _____

SURGICAL

Estimated length of stay
Ward/ Bed_____ ICU _____
Procedure / Plan _____
Name of Surgery /Procedure/ Category _____
Type of anesthesia _____
Estimated cost of implants _____
Estimated Investigations
Routine _____
Medium _____
High _____
Estimated Pharmacy / Consumables
Routine _____
Medium _____
High _____
Asst Surgeon (if any)
Special Equipment (if any)
Surgeon from any other speciality

Other / Misc. Charges _____

Name of Doctor _____ Speciality _____

Signature _____ Date _____

Surgery patients to please note :

1. Please confirm the bed status for your admission before arrival to the hospital on the scheduled date ( )
2. Please bring your OT booking slip on the day of admission.
3. Please bring all your reports/ Angio CD/ Cassette (if applicable) at the time of admission
4. Please refer to In Patients guide for further information.

Undertaking by Patient/ Attendant :

I_____ S/o, d/o, w/o_____ R/o_____ hereby undertake to pay all medical & services charges for treatment to be provided to_____ (name of Patient), by the Hospital. I have understood the above estimated amount may increase or decrease depending upon the actual treatment provided per the medical condition._____ (Signature)

(For Office Use Only)

Emergency contact _____ Phone no. _____
Billing Contact _____ Phone no. _____
Informed Nursing station : & time of info _____
Name of staff _____
PCC / PCE signature _____ Date & Time _____
Photo ID / Address proof collected _____

Disclaimer :

The estimate of _____ given for the proposed treatment of _____ [Name of Patient] has been calculated on the basis of preliminary assessment of the Doctor. This estimated amount may increase or decrease based on the actual treatment & services to be provided to the Patient during his/her stay in the Hospital. Hospital shall not be liable for any decrease/increase of the treatment expenses and Patient shall be responsible to clear all the dues as and when accruing against the services provided by the Hospital.

2.9 Observational Analysis

2.9.1 Positive Features

- All the signage is in local language and placed appropriately.
- Eleven steps of hand washing protocol, Mission-Vision and department specific charts are put up at every Nurses Station, desks and supervisor rooms.
- Security guards are assigned at the entrance of every ward/area and elevators to maintain decorum.
- In-house ATM facility available.
- Special play area for children

2.9.2 Limitations

- Number of washrooms in OPD area is less compared to patient load.
- According to NABH guidelines, there should be a prayer room in the hospital, which is not present in Max Super Speciality Hospital, Mohali.
- Radiation exposure is on three floors (Lower Basement- Radiation Therapy, Ground Floor- Radiology and Nuclear Medicine departments and First Floor- Endoscopy/Bronchoscopy, Cath Labs).
- IPDs and ICUs are supposed to be quiet, acknowledging the demand of the patients, but nursing staff creates lot of noise.
- There is no queue system in pharmacy.
- There is no waiting area for pharmacy. It's combined with the OPD waiting area.
- Space constraint in OPD and Cafeteria as well as less sitting arrangement.
- Delayed response of the staff to the bell alarm by patients in IPD.
- Despite of different coloured uniforms for clinical and non-clinical staff, there still is no distinction in the overalls of physicians and paramedical staff.
- Informed consent to be filled by patient or their family members before undergoing any procedure is not in local language and incompletely filled.
- Red and Yellow coloured bags are used in the OP-Pharmacy where only green coloured bags should be used. Red bags are used for high alert medication and the yellow bags are used for stat/now orders.
- Number of chairs is present is a big problem in IPDs.

2.9.3 Suggestions

1. Chairs in the waiting area can be better organized and more chairs can be added by utilizing space properly.
2. Only green coloured bags should be used in the pharmacy replenishing their stock well in time by setting an appropriate Re-Order Level.
3. Dress Code for all the staff should be properly worked out assigning different colours to different staff members to avoid confusion. Charts explaining the colour code can also be displayed at various places.
4. A floor monitor (Can be made someone from the supervisors' team) should be assigned specifically to maintain discipline among the staff members.
5. Proper queue system should be implemented in the OP-Pharmacy with a help of a security person or a token system.
6. Nurses should be briefed and strictly monitored to answer the in-patient's call within a span of five minutes.
7. More chairs and other furniture should be bought and adequately distributed.
8. Informed consent should be duly signed and completed there and then at the time of admission or procedure. Strict action should be taken against the assigned staff who fails to do so.
9. A pooja room/area should be accommodated near the front desk on ground floor.

2.9.4 Conclusion

Max Super Speciality Hospital, Mohali is one of the leading hospitals in Punjab providing healthcare services to patients from the whole of North India. Average OPD patients for a day sum up to 324 resulting a jam packed setting from morning to evening. The occupancy of IPD also reaches a 100 percent indicating heavy patient load. The three cafeterias present in the premises along with the Food and Beverage department fully cover the patients, their attendants and staff well. The staff is well mannered and courteous. But since nothing is perfect, the management of this hospital isn't free of errors either. However, the able and dedicated staff of the hospital leaves no stone unturned in minimizing those. Since we didn't get an opportunity to visit every department and observe their functioning in detail, we could only list down the more visible cases of mismanagement. But we can easily say that with a very skilled team of doctors and dedicated nursing, administration and non-administration staff, Max Super Speciality Hospital, Mohali can achieve greater heights

Project Report

On

Audit on Diabetes Management of Indoor Patients in Max Hospital

An Audit On Diabetes Management of Indoor Patients in MAX Hospital

INTRODUCTION

Diabetes has reached epidemic proportions worldwide, resulting in increased hospital admissions for patients with diabetes. Numerous studies have been published on the advantages of good glycemic control and associated improved outcomes. This relates mostly to more rapid recovery from infections, shorter intensive care stays with reduced mortality, improved prognosis after myocardial infarction, reduced deep wound sepsis and fewer nosocomial infections. According to the American College of Endocrinology(ACE), one way of achieving improved glycemic control is to implement a standardised inpatient management protocol. The complexity of inpatient glycemic management necessitates a systems approach that facilitates safe practices and reduces the risk for errors. Systems that facilitate the appropriate use of scheduled insulin therapy, with institutional support for inpatient personnel who are knowledgeable in glycemic management, are essential for achieving safe and reasonable levels of glycemic control in hospitalized patients

Inpatient management of hyperglycemia and avoidance of hypoglycemia have become important measures of the quality of health care available to hospitalized patients. Performance measures have become important tools for widespread assessment and benchmarking of quality of diabetes care and are a key motivator for improvement of quality.

Both under-treatment and over-treatment of hyperglycemia are safety issues in the hospitalized patients. Unrecognized and untreated hyperglycemia is an “error of omission” because hyperglycemia creates an unsafe setting for the treatment of illness and disease. Undertreatment may occur as a result of failure to treat pronounced

hyperglycemia or inappropriate use of insulin. The fear of hypoglycemia is a barrier to adequate glycemic control, and yet the risk of hypoglycemia may actually be reduced by a policy of intensive glucose management.

Clinical audits present a practical approach to systematically evaluate quality of patient care and identify treatment gaps between current practices and target goals.

Section 1 AIM OF THE STUDY

To assess the status of glycemic control and methods utilised in the inpatient management of diabetes in the hospital.
The need for the introduction of a standardised inpatient diabetes management protocol was also assessed.

1.1 RATIONALE

Strict inpatient glucose monitoring and control results in rapid recovery and improved clinical outcomes.

1.2 RESEARCH QUESTION

- Does inpatient management of hyperglycemia represent a safety concern?
- What treatment options are available for achieving optimal glycemic targets safely and effectively in specific clinical situations?
- What systems need to be in place to achieve glycemic targets?
- What are the optimal strategies for transition to outpatient care?

1.3 OBJECTIVES

To assess the quality parameters of glucose monitoring and clinical management of diabetic indoor patients in a tertiary care hospital.

Quality Parameters on which the study is based:

Criteria 1: Pre and post prandial blood glucose(BG) monitoring.

Criteria 2: Recording of HbA1c during admission, if recent value (last 3 months) is not available.

Criteria 3: Documentation of BG at the time of admission and discharge.

Criteria 4: Diet management during hospital stay and instructions at the time of discharge.

Criteria 5: Strict guidelines of endocrinologist's consultation.

Criteria 6: Follow up of patient after discharge.

Section 2 METHODS

2.1 Study area

Max Super Speciality Hospital, Mohali

2.2 Sample design

Descriptive Cross-sectional study.

2.3 Sample size

An audit was done of 100 consecutive hospital records of diabetic inpatients.

2.4 Sampling Technique

Convenience Sampling

The first 100 patients who had Type 2 diabetes and got admitted to the hospital between Dec 23, 2015 to Feb 1, 2016 were selected. Specific attention was paid to the methods of inpatient glycemic monitoring and glucose control. Hospital records were audited independent of the reason for admission or the severity of the disease to prevent bias.

Section 3 DATA COLLECTION

Data was extracted from case records using particularly nursing records, BG monitoring/insulin prescription chart, the general prescription chart, discharge summary and the case notes.

Evaluation focused on the appropriateness of the method and level of glycemic control for individual patients and evaluation of diabetes-related complications and risk factors. The frequency of blood glucose measurements as well as the duration of hospital stay were noted. Diabetes follow-up arrangements following discharge from hospital were also evaluated. The audit was done in a structured way after patient discharge, addressing the specific aspects mentioned above.

3.1 Data Compilation

- Detailed clinical data was abstracted from the medical records of 100 diabetic patients.
- All the patients had been discharged before the audit was conducted.
- Only patients admitted to the adult units of the hospital were included in this audit.
- Variables used were patient demographics, BG levels during admission, duration of hospitalisation, duration of diabetes, diabetes treatment before hospitalisation, primary reason for hospitalisation, inpatient glucose monitoring schedule and management, and follow up after discharge.

3.2 Data management

- Data were captured electronically and analysed on Microsoft Excel.
- All descriptive data and proportions are reported as percentages and continuous variables are reported as means with standard deviations (SD).

3.3 Outcome measures

Outcome measures that were evaluated were:

Glycemic control during hospitalisation as well as at time of discharge, duration of hospital stay and patient outcome, and the frequency of in-hospital disease and treatment related complications.

Appropriateness of inpatient management of diabetes was based on the guidelines of the American Diabetes Association(ADA). The criteria included three aspects for patients on insulin who were not-fasting: basal insulin, prandial insulin and supplemental or adjustment insulin.

Section 4 Findings and Discussion

100 medical records of diabetic inpatients admitted between December 23, 2015-February 1, 2016 were audited to evaluate and assess current practices in the care of indoor diabetes patients.

The study findings and observations are presented below:

Patient and hospitalisation characteristics:

- Only patients admitted to the adult units of the hospital were included in this audit.
- The mean age of patients at the time of admission was 65 years with a SD of 9.1 (a range of 42 to 89 years).
- The median duration of admission was 5 days with a range of 1 to 21 days. Predominantly males (n = 67, 67%) were hospitalised.

- No significant difference was demonstrated in the duration of diabetes between the two gender categories, 11.22 vs.11.34 years.
- Of the 100 patient records audited, duration of diabetes was documented in 89 medical records.
- The median duration of diabetes in hospitalised patients was 10 years. Of note is that 25% of patients had diabetes for more than 15 years.

The table below shows the patient demographics, their primary complaint for admission, treatment history, duration of hospital stay and duration of diabetes expressed as mean, standard deviation and percentage.

Table 2. Patient demographics and the primary complaint for admission

Audit of Diabetic Inpatients	n=100		Mean/Median		Standard deviation/Range
Gender	Males	67			
	Females	33			
Patient Age(mean years)			65		9.1 (42-89)
Duration of hospitalisation(median years)			5		(1-21)
Duration of diabetes in patients with diabetes diagnosed before hospitalisation(median years)			10		

		Number	Percentage
Diabetes Treatment before hospitalisation	None	1	1%
	Diet only	1	1%
	OHAs	69	69%
	OHAs + Insulin	15	15%
	Insulin twice daily	6	6%
	Insulin Basal Bolus	1	1%
	Irregular T/t with OHAs	6	6%
		Number	Percentage
Newly Diagnosed		1	1%
Primary reason for hospitalisation	Diabetes control	10	10%
	Cardiovascular disease including stroke	44	44%
	Renal disease	27	27%
	Respiratory disease	4	4%
	Gastrointestinal disease	7	7%
	Leg& foot problems	3	3%
	Hypertension	2	2%
	Others	3	3%

Inpatient Deaths

Most patients improved during hospitalisation (97%), but 3 patients died after admission, two females and one male. Of the 3 patients who died, two had acute coronary syndromes complicated by diabetic ketoacidosis (DKA) and one died of heart failure.

Inpatient Treatment:

Hospital records show that 39 patients were treated with an insulin sliding scale, 32 were treated with oral agents only, 26 were treated with oral hypoglycemic agents(OHAs) plus a daily dose of NPH insulin and with pre-mixed insulin twice daily. Only 3 patients received IV insulin as they were suffering from severe DKA.

The percentage compliance seen with the standard glucose management protocol is shown in **Table 3.**

The table shows that glucose monitoring schedule is irregular in 23% patients, 82% patients received endocrinologist's consultation and follow up. The clinicians are well compliant with the maintenance and recording of HbA1c and BG levels.

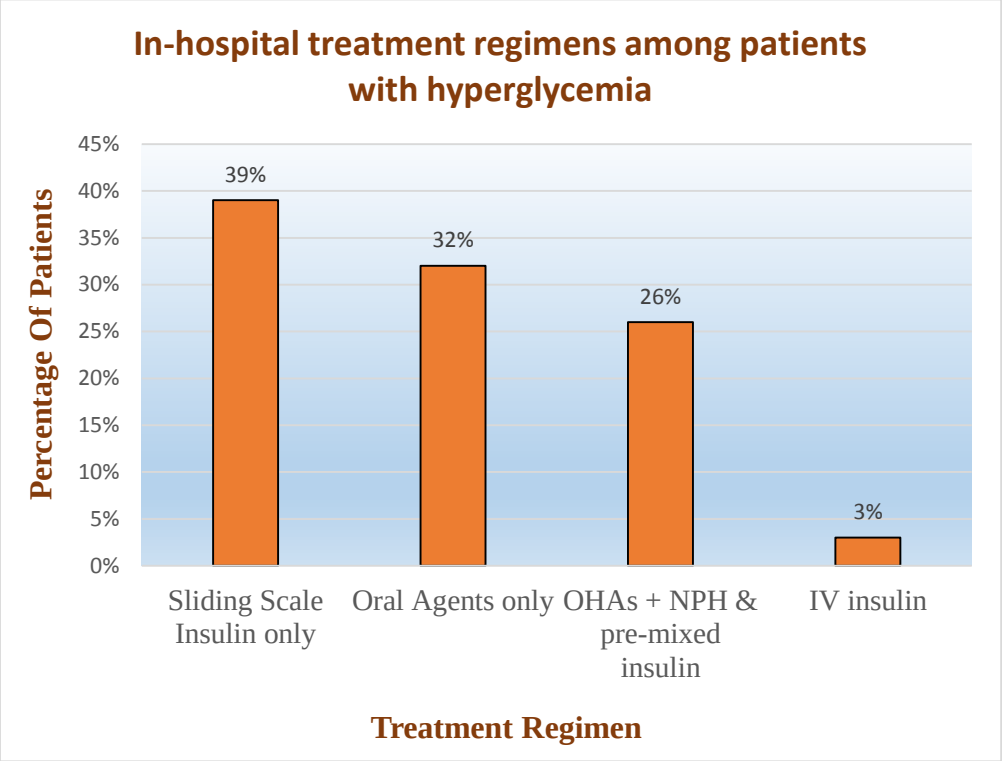
Table 3 Percentage compliance with the standard glucose management protocol

Audit of Diabetic Inpatients		Number	Percentage
Glucose Monitoring schedule	Monitoring in relation to meals	16	16%
	4-6 hourly RBS monitoring	46	46%
	Every 2 hours monitoring	3	3%

	Irregular monitoring	23	23%
	Not documented	12	12%
HbA1c recorded during admission		100	100%
Blood Glucose recorded & documented	At Admission	92	92%
	At Discharge	Nil	0%
Audit of Diabetic inpatients		Number	Percentage
Diet Management & Instructions	During hospital stay	100	100%
	Following discharge	100	100%
Endocrinologist's Consultation	During Hospital Stay	82	82%
Follow Up After Discharge	With Primary Consultant	100	100%
	With Endocrinologist	82	82%

The treatment regimens of the diabetic patients in the hospital are shown in **Figure 14.**

. ***Figure 14. In-hospital treatment regimens among patients with hyperglycemia***



As **Figure 12.** shows that SSI is still being used as a treatment regimen in 39 patients so the clinicians should be discouraged to use this regimen for BG control.

Criteria 1: To evaluate practicing Pre & Post prandial blood glucose monitoring:

Pre & post prandial BG monitoring is an important parameter to evaluate influence of food on BG levels. Pre- meal tests can provide an indication of how well patient's body is coping, with support from any medication and with previous meal. Post-prandial BG levels are largely affected by the meal eaten, the type and dose of medication and how sensitive patient's body is to insulin. Post- prandial BG measurements are commonly taken two hours after eating meal.

Quality control:

Standard to be followed:

According to ADA guidelines, glucose monitoring should be:

Glucose monitoring schedule based on nutritional intake, insulin regimen and special patient situation:

Diet	Regimen	Glucose monitoring schedule	Special caveats.
NPO	Intravenous insulin infusion	Every 1-2 Hrs.	
Eating 3 meals per day	Basal/bolus regimen with long acting (Glargine, Levemir) and rapid-acting insulin with meals (aspart, lispro, glulisine)	4 times per day: before breakfast, before lunch, before dinner, and bedtime.	Consider a 3 am blood glucose check in patients at risk for hypoglycaemia
Patients eating small multiple meals per day. (e.g. cystic fibrosis)	Basal/bolus with long acting insulin and rapid-acting insulin with meals. (carbohydrate counting)	At least 4 times per day:before breakfast, before lunch, before dinner, and bedtime	More frequent checks might be warranted in order to include post-prandial blood glucose.

- According to ADA guidelines the advantage of pre & post-prandial glucose monitoring is that it helps in evaluating patient's diet or meal choices. Post-prandial BG levels are largely influenced by the meal eaten, the type & dose of medication taken and how sensitive is patient's body to insulin.

Quality factors achieved:

- A regular pre- & post -prandial BG was monitored for 65 patients.
- 46% had regular (either four- or six-hourly) monitoring and only 16% were monitored in relation to meal.
- 39 were treated with an insulin sliding scale.
- 26 were treated with OHAs plus a daily dose of NPH insulin and/or with pre-mixed insulin twice daily.
- Only 3 patients were kept NPO at some stage during hospitalisation. These 3

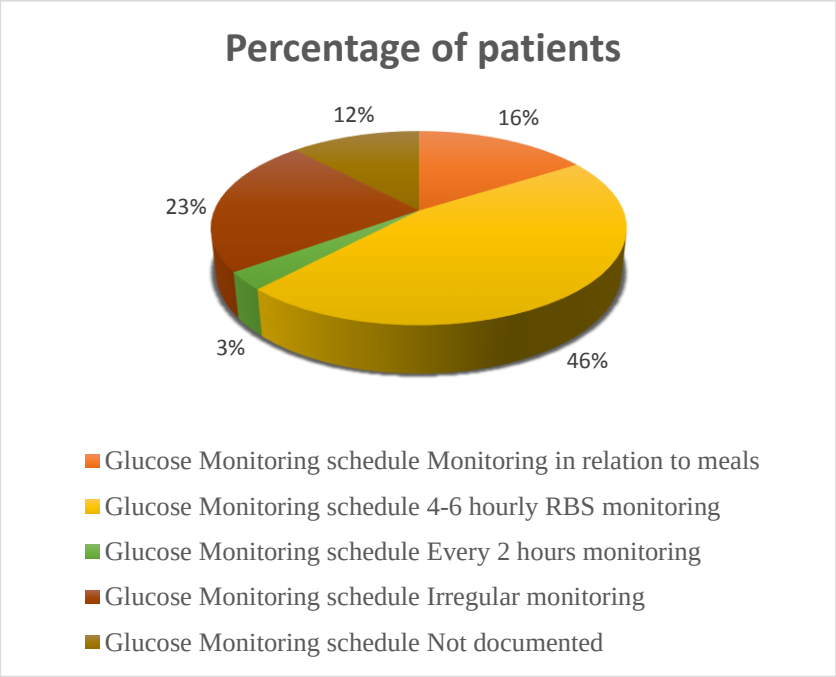
patients were suffering from DKA and received insulin infusions as a part of DKA treatment regimen. BG monitoring for these patients was done every 1-2 hours as per the ADA guidelines.

Quality Deficit:

- 23% of patients had irregular and erratic glucose monitoring.
- Other patients who were treated with OHAs and OHAs + insulin were not monitored regularly.
- Frequency of BG monitoring was irregular in 23% patients.

Figure 15. shows the glucose monitoring schedules of diabetic inpatients.

Figure 15. Glucose monitoring schedule of diabetic inpatients



Criteria 2: Recording of HbA1c during admission (if previous 3 month's value is not available).

Measuring HbA1c reflects average BG levels over a duration of 60-90 days, providing a useful longer-term guage of BG control. This gives the physician useful information

about patient's current level of BG control. HbA1c target for people with diabetes to aim for is around ≦7%. High BG levels indicates greater HbA1c value.

Quality control

As per ADA guidelines, for every diabetic patient admitted to the hospital, HbA1c test should be done unless the physician managing the diabetes care has access to a recent HbA1c test result.

Quality factors achieved:

- 100% compliance was observed in recording of HbA1c for all diabetic inpatients.
- This is as per the strict guidelines from the hospital and is included as a standard operating protocol for management of diabetic patients.
- Along with HbA1c test, routine blood and urine examination is also advised for each patient.
- For some patients whose recent HbA1c measurement was available, a retest was also ordered.

Criteria 3: Documentation of blood glucose at the time of admission and discharge.
Quality control:

- Every patient's random blood sugar should be checked at the time of admission and at the time of discharge, to evaluate patients' BG levels. These readings should be well documented in the patient files to have a proper record for follow up.
- According to ADA guidelines, all patients with diabetes admitted to the hospital should have their diabetes type clearly identified in the medical records.

Quality factors achieved:

- Hospital guidelines support recording of random blood sugar(RBS) at admission of each and every patient irrespective of his medical condition.
- Tests are conducted for every patient but in some records it was not documented.

Quality deficit:

- A major flaw has been observed that the BG levels are not recorded and documented just prior to discharge.
- The BG levels are usually recorded a night before discharge or few hours before discharge.
- This is a quality deficit which should be rectified and each & every patient should also be monitored at the time of discharge and the results should be documented to prevent any disconnect in the levels recorded earlier and at discharge.

Criteria 4: Diet management during hospital stay and instructions at the time of discharge:

Quality control:

Medical nutrition therapy(MNT) is a key component of the comprehensive management of diabetes and hyperglycemia in the inpatient setting. Maintaining adequate nutrition is important for glycemic control and to meet adequate caloric demands. All the patients admitted to the hospital with diabetes or hyperglycemia should be assessed to determine the need for a modified diet in order to achieve calorie demands. The goal of MNT is to create a discharge plan for follow- up care of the patients so that proper outpatient diabetes status can also be evaluated and improved. Due to complexity of nutrition issues in the hospital, a registered dietician, knowledgeable and skilled in MNT, should serve as an inpatient team member. The dietician is responsible for integrating information about the patient's clinical condition, meal planning and lifestyle habits and for establishing treatment goals to determine a realistic plan for nutrition therapy.

Quality factors achieved:

Hospital guidelines support management of diet of indoor patients by a registered dietician. Records of advised diabetic diet with timing are recorded and maintained, diet instructions are explained to the patients and documented in the discharge summary.

Criteria 5: Strict guidelines of endocrinologist's consultation. (Figure 3)

A timely consultation of an endocrinologist is important to improve quality of care, reduce length of stay(LOS) and improve patient outcomes.

Consultation helps to achieve the BG targets with patients with hyperglycemia. According to a study done at a tertiary care facility in India, patients managed by designated specialists had better control than those managed by physicians.

Quality factors achieved:

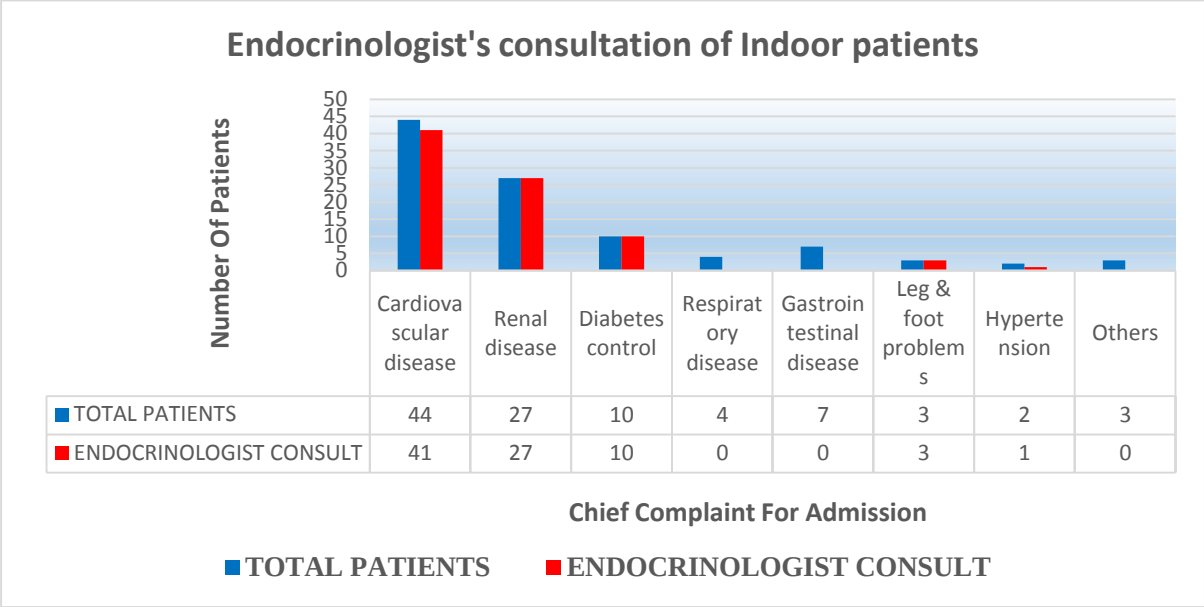
Hospital records show that 82% patients were treated and evaluated by an endocrinologist.

Quality deficit:

- 18% patients were not evaluated by an endocrinologist at any stage during their stay in the hospital.
- This is a quality deficit which should be corrected to ensure efficient monitoring of BG and achievement of target BG levels in patients with hyperglycemia.

Figure 16 shows the number of patients receiving endocrinologist's consultation during hospital stay irrespective of the chief complaint.

Figure 16. Number of patients who received endocrinologist consultation during hospital stay



As seen in **Figure 16**. All the patients did not receive consultation by a diabetes specialist. So this is a quality deficit which must be considered and standard protocol should be made so that every diabetic patient,(irrespective of the chief complaint) getting admission should be seen and treated by an endocrinologist for glucose management.

Criteria 6: Follow up of patients after discharge:

Discharge planning, patient education, and clear communication with outpatient providers are critical to ensure safe and successful transition to outpatient glycemic management. Preparation for transition to the outpatient setting is an important goal of inpatient diabetes management and begins with the hospital admission.

An outpatient follow-up visit with the primary care provider, endocrinologist, or diabetes educator within 1 month after discharge from the hospital is advised for all patients having hyperglycemia in the hospital.

Clear communication with outpatient providers either directly or by means of hospital discharge summaries facilitates safe transitions to outpatient care,

Providing information regarding cause or the plan for determining the cause of hyperglycemia, related complications and comorbidities, and recommended treatments can assist outpatient providers as they assume ongoing care.

Quality factors achieved:

- All the discharge summaries included follow up of patients with the primary care provider.
- Self- monitoring of BG was mentioned and explained in the discharge summary of all the patients.
- Home BG goals were also explained to the patients.
- 82% patients were instructed to record their daily sugar levels (pre and post prandial) and report back to the endocrinologist after 3 days of discharge.
- Information on consistent eating of diabetic diet was also explained and documented in the discharge summary of all the patients.
- Sick day management instructions were mentioned in all the discharge summaries.
- Only self-monitoring and diet instructions were given to these patients.

Quality deficit:

- 18% discharge summaries did not include instructions of follow up with the endocrinologist for evaluation of their blood glucose targets.
- Only self-monitoring and diet instructions were given to these patients.

DISCUSSION

The audit shows that glycemic control management in 23% patients is still sub-optimal, with 77% proper treatment schedule & control.

The deficiencies were observed both in processes of care (eg. limited use of basal insulin) and in outcomes (ie, glycemic control) compared with ADA guidelines.

Erratic BG monitoring in some patients could have been due to the lack of a ward schedule for testing blood glucose, or failure to prescribe appropriate orders. Time based monitoring, that is 4-6 hourly; is appropriate for patients who are fasting or who receive continuous tube feeds or total parenteral feeding. Thus, at the time of this study 65% were monitored optimally.

The optimal way of treating hospitalised diabetic patients would be to administer the patient's usual treatment, with adjustment to compensate for a more fixed & regulated hospital diet.

In addition, patients should receive meal-related supplemental insulin according to BG levels. The administration of insulin according to sliding scale is inappropriate. Sliding scale insulin(SSI) regimen use should be discouraged as per ADA guidelines.

This audit indicated that sliding scales were still used inappropriately in 38 of the 100 patients.

SSI should be avoided because rather than being proactive in preventing wide fluctuations in BG levels, these regimens are reactive and work to treat hyperglycemic episodes after they have already occurred.

A study done at Manipal Hospital in India showed that glycemic control was achieved in 48% cases, was sub-optimal in 15%, and poor in 37% of hospitalised diabetic patients. The study also indicated that patients managed by designated specialists had better control than those managed by physicians.

The management of diabetes in a UK study was considered inappropriate in 29% patients who were not referred to a diabetes management team.

In the audit, better control of glycemic state by diabetes specialists was not compromised with more frequent hypoglycemic episodes, which is very encouraging. Hospitalisation for whatever reason should be taken as an opportunity to educate patients regarding diet, glycemic control, insulin injection technique,foot care, glucometer checking etc.

LIMITATIONS

- Small sample size due to time constraint, thus limiting the ability to detect other possible significant predictors of glycemic control, thus limiting generalizability.
- Data was extracted from the Hospital Information System, may not be purely accurate and complete.

Section 4. RECOMMENDATIONS

- It is recommended that **Point-of-care (POC) blood glucose monitoring** performed at the bedside should be used to guide therapy. Any POC glucose result that does not correlate with the patient's status should be confirmed through conventional laboratory sampling of plasma glucose.
- **Flash Glucose Monitoring System** is a new device to continuously measure glucose in interstitial fluid without a prick. This device is more cost-effective than the current diabetes monitoring tools because it records glucose levels every 15 minutes, thus giving the doctor comprehensive data for a complete glucose profile of the patient.
- Every patient's **RBS should be checked** at the time of admission and at discharge to maintain continuity of records and medical care.
- **Creation of a multidisciplinary steering committee** guided by an endocrinologist can establish reasonable and achievable glycemic management goals with use of protocols and order sets.
- Appropriate **inpatient management of hyperglycemia by a specialist** can reduce cost of care and reduce the risk of septicaemia.
- **Follow up with an endocrinologist** should be instructed and documented in the medical records of all the patients with hyperglycemia.
- An outpatient follow-up visit with the primary consultant, endocrinologist, or diabetes educator within 1 month should be advised for all patients having hyperglycemia in the hospital.
- A smooth inpatient-to-outpatient transition is critical. **Appropriate discharge planning** with identification of subsequent glycemic management plans and

follow-up should be explicit.

- Hospital guidelines for follow up instructions with the endocrinologist needs to be reviewed to assess the patient's self BG monitoring ability.
- **Promote systems that can evaluate diabetes-related data on an ongoing basis and guide quality improvement efforts.**

Section 5. CONCLUSION

Inpatient management of diabetes needs more attention. Glycemic control & treatment schedule was not found to be optimal in a number of patients in the hospital. It is necessary to standardise intervention of inpatients who were admitted with diabetes as a secondary medical problem. The central goals should be to identify reasonable, achievable, and safe glycemic targets and to describe the protocols, procedures: & system improvements needed to facilitate their implementation.

Institution wide quality improvement efforts should probably target both physician and nursing behaviour and should focus on increasing use of basal and nutritional insulin. As proposed by ADA, avoiding use of SSI by itself, and performing daily insulin adjustment in response to previous hypo- or hyperglycemia.

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It was also evident from the audit that standards of care need to be established. The result of this audit was shared with the medical and nursing staff and the areas that need improvement were highlighted. A future survey will be performed to see the improvement in the quality of diabetic care.

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ANNEXURES

(a) Data Collection Format

Following is the checklist which was used to collect information about Diabetic Inpatients:

VARIABLES USED	Characteristics on which results were analysed and interpreted
Max ID mentioned	Yes/No
Age mentioned	Yes/No
Sex mentioned	Yes/No
Suffering from DKA	Yes/No
Indication for Admission	• cardiovascular disease • renal disease • diabetes control • leg and foot problems • hypertension • gastrointestinal disease • respiratory disease • others
RBS recorded at admission	Yes/No
RBS recorded at discharge	Yes/No
Duration of Diabetes documented	Yes/No
Medication before admission	• None • Diet only • OHAs • OHAs + Insulin • Insulin Twice daily • Insulin Basal Bolus
Treatment after admission	• Insulin + OHAs • Sliding Scale Insulin • OHAs • IV Insulin
Glucose monitoring schedule	• 4-6 hourly RBS • 2 hourly • Pre-meal/post-meal charting • Not documented
Length of stay	
Orders clearly written and informed	Yes/No
HbA1c checked	Yes/No
Diet management by a dietician	Yes/No
Consultation by an Endocrinologist	Yes/No
SGM and Diet & Exercise Instructions Given At the time of Discharge	Yes/No
Follow up after discharge	Yes/No