Summer Placement

In

Kokilaben Dhirubhai Ambani Hospital, Mumbai

Report on

Lean-Six Sigma Approach on Irrelevant Phone Calls at Accident and Emergency Department

(April 6th to May 31st, 2015)

By

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MBA Hospital and Health Management
2014-2016

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

IIHMR UNIVERSITY

CERTIFICATE

This is to certify that Dr. Deepika Rakesh Shukla has undergone her Summer Training in Kokilaben Dhirubhai Ambani Hospital, Mumbai from 6th April 2015 to 31st May 2015. The candidate herself carried out all the studies related to her Summer Training. Her approach to the study has been scientific and analytical.

The summer training is in partial fulfilment of the course requirement recommended for the award of Master of Business Administration-Hospital & Health Management.

I wish her success in all her future endeavours.

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Kokilaben Dhirubhai Ambani
hospital & medical research institute

Every Life Matters

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Deepika Shukla** has worked as an intern in Kokilaben Dhirubhai Ambani Hospital from 6th April, 2015 to 31st May, 2015.

During her tenure as an intern she has worked on the following case studies:

1. Lean approach to reduce report turnaround time in Imaging department of Kokilaben Dhirubhai Ambani Hospital.
2. A study on documentation and process compliance of NABH quality indicators at Kokilaben Dhirubhai Ambani Hospital.
3. Lean Six Sigma approach to reduce irrelevant phone calls to Accident and Emergency department.
4. A study on patients' rights violation in the hospital

I wish her best of luck for her future endeavor.

Regards,

KOKILABEN DHIRUBHAI AMBANI HOSPITAL * MUMBAI 53

Dr. Mihir Dalal
Deputy General Manager
Kokilaben Dhirubhai Ambani Hospital
Mumbai

Acknowledgement

First and foremost, I would like to thank my parents for their unconditional love for me, their continual support to all my decisions, for understanding my objectives in life and allowing me to express myself freely.

It is my utmost privilege to be a part of INSTITUTE OF HEALTH MANAGEMENT AND RESEARCH (IIHMR), which stands as an institute of national importance and a centre of excellence in Healthcare education in India.

With immense pleasure I express my heartfelt gratitude to the Director of IIHMR Jaipur, Dr.S.D.Gupta, and Dean, and my mentor Dr. Monika Chaudhary for giving me this opportunity to undergo training.

I also express my gratitude to Executive Director Kokilaben Dhirubhai Ambani Hospital Dr. Ram Narain for giving us this opportunity to undergo training with Kokilaben Dhirubhai Ambani Hospital.

I am extremely indebted to all the professionals at Kokilaben Dhirubhai Ambani Hospital for generously sharing their knowledge and precious time which inspired me to do my best during summer training. I would like to thank Dr. Mihir Dalal (Deputy General Manager, Clinical Administration) and Dr. Nilesh Gumardar (Executive, Clinical Administration and Mentor), and my revered Guide Dr. Monika Chaudhary without whose help it would have not been possible for me to complete my project. I am highly grateful to all the staff of Accident and Emergency Department as well as the staff at call centre at the KDAH hospital for their cooperation which enabled me to complete my study.

I am also very thankful to Dr. Pratiksha Oswal for her valuable suggestions, without her insights on statistics related to this project; it would not have been possible for me to look into niche opportunities of my project.

I would also like to express my heartiest thanks to all my friends for extending their help as

and when required and for making moments to be cherished for lifetime. Without their support this would not be possible.

Deepika Shukla

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Acronyms/Abbreviations

- **A&E - Accident and Emergency**
- **DAMA -Discharge Against Medical Advice**
- **HCA -Health Care Assistant**
- **ALOS -Average Length Of Stay**
- **CMD – Chief Medical Director**
- **COO – Chief Operating Officer**
- **CGHS – Central Government Health Scheme**
- **CSSD – Central Sterile and Supply Department**
- **CT – Computerized Tomography**
- **ECG – Electro Cardiogram**
- **TMT – Treadmill Test**
- **EEG – Electro Encephalography**
- **EMG – Electro MyoGraphy**
- **HOD – Head Of Department**
- **HRD – Human Resources Department**
- **ICU – Intensive Care Unit**
- **SICU- Surgical Intensive Care Unit**
- **MICU- Medical Intensive care Unit**
- **HDU-High Dependency Unit**
- **PICU-Paediatric Intensive Care Unit**
- **NICU-Neonatal Intensive Care Unit.**
- **IPD – In-patient Department**
- **KDAH – Kokilaben Dhirubhai Ambani Hospital**
- **MRD – Medical Records Department**
- **MLC – Medico Legal Case**
- **NICU – Neonatal Intensive Care Unit**
- **OPD – Out Patient Department**

About Summer Training

The MBA in Health and Hospital Management program of the Institute of Health Management Research (IIHMR) aims at preparing professionally trained managers of health care organizations and hospitals to meet the increasing need for managerial skill. It involves an eight week summer placement for the first year students to provide them with a firsthand experience of the hospital system or environment. As a part of the program I had the privilege to undergo my practical training at Kokilaben Dhirubhai Ambani Hospital, Mumbai to get a firsthand knowledge and experience about the functioning of the hospital. I worked all through under the operations and quality team there from 6th April 2015 to 31st May 2015. The main aim of the summer training was to get exposed to operation of all the hospital in general, and an in-depth insight of the third party administrator, pharmacy, medical records department and laboratory in the hospital in particular.

Objective:

The summer training program had the following objectives:

- To have a basic orientation of the hospital set up.
- To study the functioning of the hospital as a system and its departments as subsystems of the hospital.
- To observe all departments in terms of their location, work plan and staffing pattern.
- To study about the staffing pattern and job responsibility of staff.
- Doing a project which is helpful to me in understanding hospital working in a better way and to the organization.

METHOD OF DATA COLLECTION:

The data collected was primary and secondary data.

Primary data was collected by:

- Personal observation during the summer training and department visits.
- Further information was gathered by discussion with the department heads and staff on the basis of unstructured interview.

Secondary data was collected from:

- The past records and hospital management information system (HMIS).

Profile of KDAH

The Institution

Kokilaben Dhirubhai Ambani Hospital & Medical Research Institute is India's newest, most advanced tertiary care facility. As the flagship social initiative of Anil Dhirubhai Ambani group, it is designed to raise India's global standing as a healthcare hub, with emphasis on excellence in clinical services, diagnostic facilities and research.

A vision to strengthen healthcare in the communities KDA Hospital serves and empower patients to make informed choices. Inaugurated in January 2009, The Hospital is a significant CSR initiative from Reliance Anil Dhirubhai Ambani Group. It is the only hospital in Mumbai to function with a FULL TIME SPECIALIST SYSTEM that ensures the availability and access to the best medical talent around-the-clock. The 750-bed hospital has over 103 full-time doctors, 520 nurses and about 200 paramedical and is growing every day.

It represents a confluence of top-notch talent, cutting edge technology, state of art infrastructure and most important, commitment. KDAH offers doctors and patient's cutting edge diagnostic and surgical solutions as well as the latest IT systems. In many cases, they represent the first of their kind in the region.

KDAH is fully geared in terms of talent, technology, structure and spirit-to reshape perceptions regarding hospitals and redefine the concept of caring. Indeed, this globally benchmarked institution marks the beginning of a new era in Indian healthcare.

History

The hospital project was initiated in 1999 by Dr. Nitu Mandke as a large scale heart hospital. Dr. Nitu Mandke was born in 1948 in a middle class family. He was first in the family to choose medicine as a profession with a determination to become a heart surgeon.

He joined B.J. Medical College; Pune from where he passed his M.B.B.S in 1970 came to Mumbai for further studies and completed his super specialty course in Cardiovascular Surgery. He spent close to 8 years working with world renowned figures in cardiac surgery like Dr. Magdi Yacoub in England and Dr. Kirklin and Dr. Pacifico at the University of Alabama in the United states. He was an all-rounder with exemplary proficiency in sports, arts, languages, mathematics and many more.

In his lifetime he won the heart of many and repaired many more through unerring surgery. He won various social awards like : The Rajiv Gandhi Gold Medal of Merit 1992, Indira Gandhi Sadhbhawna Award 1999, Outstanding Man of the 20th Century 2000, Pride of India 2001, Sarvashri Gold Medal 2000 and Maharashtra Gaurav Award to name a few.

With great passion Dr. Mandke built a substantial portion of the hospital building. Sadly his dream was cut short by fate when he succumbed to a massive heart attack in May 2003 ; leaving a dream unfulfilled and unfinished.

The Management of Mandke Foundation approached Reliance ADA Group, who graciously took over this project and developed it into one of the most modern and state of art multispecialty tertiary care hospital; naming the institution as – Kokilaben Dhirubhai Ambani Hospital & Medical Research Institute.

In honour of the initiator, the hospital's Medical Convention Centre has been aptly dedicated to the memory of Dr. Nitu Mandke.

VISION

We aim to be a global healthcare institution that combines the best in medical treatment with strong ethical principles and a culture of care and compassion.

VALUES

Integrity: To deal with all stakeholders – patients, partners, employees, vendors and the community – in the spirit of fairness and integrity

Transparency: To respect the patient's right to know at every touch point by providing information that is clear, concise, relevant and easy to understand.

Maximum Care: To re-evaluate every hospital system, process and procedure to ensure those patients and their loved ones receive maximum care and comfort.

Self - Improvement: To instil a process of learning and self - improvement at every level through continuous training, focused research and peer review.

Patient Dignity: To safeguard the dignity of patients by protecting their individuality and privacy at all times.

KEY STATISTICS

Encompassing ten lakh square feet of space spread over 17 floors and two basements. Its intelligent framework allows for hospital staff to optimize utilization of space and resources.

Accommodates over 750 inpatient beds, allows optimal utilization of resources and ensures privacy, dignity, comfort, convenience and the best healthcare to every patient with smooth and seamless movement of people & staff guaranteed.

Critical care unit has the largest number of critical care beds in Mumbai, with 130 ICU beds. Special technical features in ICU including ceiling mounted, dual arm pendants which ensure

that the space around the patient is not cluttered. Another unique feature is dedicated air supply that keeps the critical care free of any kind of contamination and infection.

It has a total of over 140 Full time consulting clinics, with the capacity to handle over 6000 outpatient consulting every day.

Movements in the hospital is managed by 30 elevators – the largest elevator bank for any hospital in India capable of transporting 7500 persons per hour, with different elevators for inpatients , outpatients, staff and other services.

Two dedicated elevators ensure quick transfer of patients to operation Rooms and ICUs.

The hospital's laboratory is housed on a single floor spread over an area of over 40,000 square feet offers over 3000 routine and highly advanced diagnostics, genetic and molecular biology test.

UNIQUE IN MUMBAI

- ✓ Mumbai's first slice PET CT Scanner that combines computed tomography and positron emission tomography technologies into a single machine.
- ✓ 140 ICU beds, largest number of critical care beds in Mumbai.
- ✓ Hospital's laboratory housed on single floor, spread over an area of over 40,000 sq ft offers over 3,000 routine and highly advanced diagnostics, genetic and molecular biology tests.
- ✓ Mumbai's Largest OT complex with 22 operating theatres.
- ✓ Largest dialysis Centre in Mumbai.
- ✓ Full-time Specialist System: All doctors are attached and available only at Kokilaben Hospital.
- ✓ Level I Accident and Emergency Centre.

UNIQUE IN INDIA

- ✓ Encompassing 10 lakh sqft of space spread over 17 floors and two basements. Its "intelligent framework" allows for hospital staff to optimize utilization of space and resources.
- ✓ Accommodates over 750 in-patient beds, allows optimal utilization of resources and ensures privacy, dignity, comfort, comfort, convenience and the best healthcare to every patient. However the smooth and seamless movement of people & staff guaranteed.
- ✓ Critical care unit has the largest number of critical care beds in Mumbai, with 130 ICU beds. Special technical features in ICU including ceiling mounted, dual arm pendants which ensure that the space around the patient is not cluttered. Another unique feature is dedicated air supply that keeps the critical care free of any kind of contamination and infection.
- ✓ It has a total of over 140 Full time consulting clinics, with the capacity to handle over 6000 outpatient consulting every day.

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- ✓ Two dedicated elevators ensure quick transfer of patients to operation Rooms and ICUs.
- ✓ The hospital's laboratory is housed on a single floor spread over an area of over 40,000 sqft offers over 3,000 routine and highly advanced diagnostics, genetic and molecular biology test and will serve as a referral Centre for second opinions.

HOSPITAL INFRASTRUCTURE

a) Lower basement

- Biomedical Engineering
- CSSD
- MRD
- Nuclear medicine
- PET CT
- Radiation Oncology
- SRS

b) Upper basement

- Car Parking
- Central security office
- Mortuary

c) Ground floor

- Main Reception
- Admission counter
- Discharge and billing
- Pharmacy & Medical mall
- Gift shop
- Prayer hall
- Business centre
- Fine dining
- Food court
- ATM
- Central report collection centre
- Beauty Salon
- Accident and emergency

d) Mezzanine Floor

- Administration

- Library
- Staff dining

e) First Floor

- Clinical administration
- Radiology & Imaging (X-Ray, MRI , Ultrasound, CT scan)
- Health check up program
- Sample collection
- Centre for cardiac sciences
- Centre for bone and joint
- Centre for pulmonary and lung medicine
- Multi-specialty OPD

f) Second floor

- Centre for children
- Centre for brain and nervous centre
- Dental clinic
- Centre for cancer
- Ophthalmology clinic
- E.N.T clinic
- Gastroenterology clinic
- Dialysis centre
- Blood bank
- Urology clinic
- Nephrology clinic

g) Third floor

- OT complex 1 (8 theatres)
- Catheterization lab
- ICU (Neurology and Surgical)
- Interventional Radiology

h) Fourth floor

- IT Servers and Systems

i) Fifth floor
   - Ambulatory surgery
   - Day surgery
   - ICU (cardiac)
   - OT complex 2 (7 theatre)
   - Refuge Area

j) Sixth floor
   - Rehabilitation centre
   - Convention and exhibition centre

k) Seventh floor
   - IVF centre
   - Cosmetology and aesthetic surgery
   - Laboratory medicine and pathology
   - Nursing College
   - Tissue and bone bank

l) Eighth floor
   - Birthing complex (labour and delivery)
   - ICU (paediatric and neonatal)
   - Birthing Suites
   - OT (obstetric)
   - Wards

m) Ninth floor
   - Inpatients (paediatric and orthopaedic)

n) Tenth floor
   - High dependency unit
   - ICU (Medical)
   - Refuge area

o) Eleventh floor
   - General ward

p) Twelfth to sixteenth floor

- Inpatient

DEPARTMENT IN THE HOSPITAL

The following departments function in the hospital

Clinical Services	Clinical support services	Clinical Administrative Services	Administrative services
Accident and Emergency	Laboratory	Ambulance services	Human resources
OPD	Imaging	Nursing department	Materials
Anaesthesia	CSSD	Food & beverages	Marketing
Critical Care	Biomedical waste	Security	Finance
OT	Housekeeping	Mortuary	Engineering
IPD	Pharmacy	Laundry	IT

CLINICAL SERVICES

ACCIDENT AND EMERGENCY

An Emergency Department (ED) is also known as Accident & Emergency (A & E), Emergency Room (ER), Emergency Ward (EW), or Casualty Department is a medical treatment facility, specializing in acute care of patients who present without prior appointment, either by their own means or by ambulance. Due to the unplanned nature of patient attendance, the department must provide initial treatment for a broad spectrum of illnesses and injuries, some of which may be life threatening and require immediate attention.

Layout

- 11 bedded (6+3 triage + 2 isolation)
- Each bed is separated with curtains to maintain patient privacy and is equipped with the following:

✓ Oxygen supply
✓ Suction Pump
✓ Syringe pump
✓ Cardiac monitor

Minor Operation theatre

- Machines in minor OT are as follows:

✓ Anaesthesia machine
✓ ETCO2 machine
✓ Cautery machine
✓ OT table

- Procedures done in minor OT

✓ Lumbar puncture

- ✓ Biopsy
- ✓ Bone marrow aspiration
- ✓ Suturing

This department has got its own billing and discharge counter.

Staff

Head of Department

9 Junior Medical Doctor (2 per shift)

1 Head Nurse

24 Staff nurse (6 per shift)

6 HCA (2 per shift)

Equipment:

- Defibrillator - 2
- Portable ECG - 2
- Nebulisation machine -2
- Portable sonography machine -1
- Trolleys :
  - ✓ Procedure trolley
  - ✓ Induction trolley
  - ✓ Adult crash cart
  - ✓ Dressing trolley

Ambulance:

There are 2 types of ambulance:

a) Non-cardiac ambulance
b) Cardiac Ambulance

Equipment in the ambulance is as follows:

- Ambulance cot
- Portable Ventilator (cardiac ambulance)
- Portable oxygen unit
- Portable suction unit
- First aid kits
- Traction splint
- Auxiliary Stretcher
- Transfer sheet
- Airways (nasal, oropharyngeal)
- Obstetrical Kit
- Sphygmomanometer
- Stethoscope
- Fire Extinguishers
- Burn Kit
- Others
    - ✓ Sterile and non-sterile gloves
    - ✓ Face mask
    - ✓ Blankets
    - ✓ Towels
    - ✓ Bed pan
    - ✓ Tongue depressors
    - ✓ Cold packs instant chemical type

- ➢ 1 HCA in non-cardiac ambulance
- ➢ 1 HCA + 1 nurse + 1 cardiac consultant in cardiac ambulance

OUTPATIENT DEPARTMENT

Kokilaben Dhirubhai Ambani Hospital has 140 independent consultant clinics with a capacity to handle over 6000 outpatient consultations every day. These clinics are organised as "functional clusters" representing a specialty, with each cluster containing its own examination room, phlebotomy room, and in instances, rooms for specialized medical equipment unique to the cluster. A day care dialysis unit, an endoscopy theatre complex, radiology suites and a blood bank support outpatient service are co-located on the same floors as the self-contained outpatient area. The hospital outpatient services offer specialist consultation services across 42 different specialities including six centres of excellence.

The six centre of excellence are as follows:

- Centre for neurosciences
- Centre for cancer
- Centre for physical medicine and rehabilitation
- Centre for cardiac sciences
- Centre for bone and joint
- Centre for children

The specialists included are Anaesthesiology, Critical Care Medicine, accident and emergency, gynaecology and obstetrics, imaging, laboratory medicine and pathology including biochemistry, molecular biology, haematology, histopathology, microbiology, clinical pathology, transfusion medicine and blood bank, genetics, tissue and bone bank, dermatology, endocrinology, gastroenterology, clinical nutrition, internal medicine, nephrology, psychiatry, pulmonary medicine, rheumatology, geriatric medicine, surgery including dentistry, ENT, general surgery, ophthalmology, plastic and reconstructive surgery, urology, surgical oncology, cosmetology.

a) Access to OPD services:

All patients who visit KDAH or free OPD for the first time for consultation/ other services are issued a card which gives each patient a UHID number. This UHID card is attached to the

registration form. With the help of this number, medical records of patients can be assessed. Allotment and control of UHID number is the responsibility of the admission staff desk.

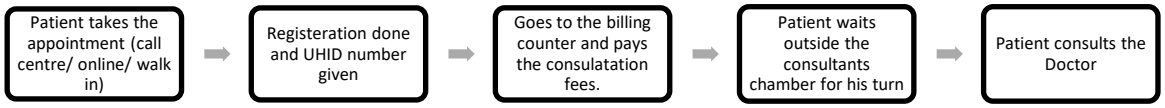
b) OPD Appointment:

Appointments can be fixed over telephone to all from the call centre or personally across the reception counter. Fax and e-mail facilities are also available.

c) OPD Tariff:

The OPD consultation fees is Rs. 1000 which is valid for 48 hours and for each subsequent visit within one month the patient has to pay Rs. 700. However, OPD consultation fees for premium doctors is Rs. 2000 valid for 48 hours and Rs. 1500 for all subsequent visits within one month.

d) Process Flow:



Following services are offered in the OPD:

- Medical / Surgical consultations
- Preventive Health check-up packages
- Laboratory investigations
- Imaging services
- Cardiology investigations
- Neurology investigations
- Pulmonary investigations
- Pain management
- AKD
- Gamma knife
- Endoscopy
- Bronchoscopy

- Urodynamic study
- Physiotherapy
- CDC
- ENT
- Ophthalmology
- Dental procedures
- Oncology
- Radiation oncology

HEALTH CHECK UP

- The executive check-up department, a part of OPD services, is a wing of this multispecialty hospital dedicates to the diagnostic and preventive side of patient care. It is a place where healthy patient come for prognosis of disease or to know about the preventive and curative aspect of conditions they may already have.
- This system facilitates the patient to get all the required investigations/consultations done without having to pay for either consultation and/or for each individual item of pathological or imaging investigation. It is the centre point where the potential customers come directly in contact with hospital services. This department can therefore be a point to draw in patients to become in-patients or for them to come even for follow up OPD consultation.
- The packages in the program have been developed by a team of highly qualified and experienced medical personnel and are designed to offer a complete medical check-up and within their limitations detect any latent health problems. In additions, these packages are offered at special discounted rates that make them truly worthwhile. At the end of the day, candidates leave the hospital with all their reports.
- This department is dependent on various other hospital departments and consultants to ensure a smooth process flow. Therefore co-ordination is a key factor in smoothly running the department. The departments in co-ordination are: pathology, radiology, cardiology, ENT, ophthalmology, dental etc. the visiting consultants are from following department: medicine, surgery and gynaecology.

OPERATION THEATRE

The aim of department of anaesthesiology and OT facility is to provide the highest quality of care to patients undergoing various types of surgeries. The OT facility is positioned as a tertiary care centre of excellence providing complete services for various surgical specialties.

The total number of OTs in the hospital is 22 out of which 19 are functional and are located on 3rd, 5th, 7th and 8th floor spread over an area of 600 square feet. There are eight OTs on the 3rd and 5th floor, two on the 7th floor and one on the 8th floor. The cases are distributed based on the capacity of each OT.

The department is staffed with highly experienced and trained anaesthesiologist, surgeons, technicians, nurses and other support staff. Their services have state-of- the-art technology and equipment with highest level environment and quality controls. For each OT there are one scrub nurse and one circulating nurse. Protocols based on approach for quality pre-operative, intra-operative and post-operative and follow up care of the patients.

Pre and Post Operative areas are demarcated on each floor. The OT complex handles around 40-45 cases each day. Cleaning of each OT is done between cases and fumigation is done at the end of the day.

Complete services to the following surgical specialties are provided.

- Cardiac surgery
- Neuro surgery
- Onco surgery
- Orthopaedic surgery
- General surgery
- Gynaecology and obstetrics surgery
- Paediatric surgery
- GI surgery
- Uro surgery

- Plastic surgery
- ophthalmic and ENT surgery
- Transplantation surgeries

IN PATIENT DEPARTMENT

The IPD provides the detailed pre-procedure needs their completion and coordination with the diagnostic to arrive at the diagnosis and completion of treatment regimens, comprehensive care in the pre-operative and follow up care, rehabilitative, and nutritional regimen and their scientific amalgamation as per the progressive patient care need. IPD wards are located on floor numbers 9,10,11,12,13,14,15 & 16 The IPD rooms are of the following types: single room, twin sharing, deluxe room and suits. Each floor has three zones, east, west and central and each wing has a separate nursing station. The various types of rooms with their features as follows:

- **GENERAL WARDS**
  - 5beds/room
  - Air conditioned
  - Bed head panels with medical gasses
  - Nurse call systems with 2 way communication

- **SINGLE ROOMS**
  - Area of 320 sq. feet.
  - Separate patient zone and attendant zone
  - Nurse call system with two way communication

- **Twin Sharing**
  - Bed head panels with medical gasses
  - Television sets
  - Couch for each patient relative
  - Nurse call system with two way communication

- **Suits**
  - Area of 750 sq. ft.

- Terrace garden
- Exclusive visitor area and guest rooms
- Nurse call system with two way communication

The nurse: bed ratio is 1:5 for general ward, 1:2 for single rooms, 1:3 for twin sharing, 1:1 for suits. The various other rooms are clean utility, dirty utility, janitor room, AHU (air handling unit), sluice room, I.T. room and service elevator.

INTENSIVE CARE UNIT

The ICU cater to patients with most severe and life-threatening illnesses and injuries requiring constant close monitoring and support from specialist equipment and medication to ensure normal bodily functions. There is Adult ICU consisting of SICU & MICU, Paediatric ICU, Neonatal ICU, Transplant ICU and Paediatric Cardiac ICU. The nurse patient ratio for critical patients is 1:1 and for stable patients is 1:2. The ICU co-ordinates with CSSD, Laboratory and the Radiology department. Strict aseptic techniques are used. Pressure zones are created to control infection rate.

The ICU has highly dedicated and trained medical, nursing and allied staff. There is a system of closed ICU in KDAH .The space per bed is 320 sq feet in the patient care area

Bed Capacity in each ICU

ICU	***BED CAPACITY***
SICU 1	11
SICU 2	10
PCICU	11
PCICU-HDU	2
PICU	7
TRANSPLANT ICU	7
NICU	8
NICU-HDU	5
MICU	28

MICU	25

Human resource of the ICU

- Intensive care doctors

✓ 1 Chief Intensivist for all ICU

✓ Junior consultants (12 hour shift)

✓ Clinical registrars (8 hours shift)

- Intensive care nursing staff

✓ 1 Director General Manager for ICU

✓ Nurse in charge (8 hours shift)

✓ Team leader (8 hours shift)

✓ Senior nurse officers

✓ Junior nurse officers

- Allied staff

✓ Physiotherapists

✓ Dieticians

✓ Biomedical Engineers

✓ Health Care Assistants

Shift timings:

For doctors

✓ Morning : 8 am - 4 pm

✓ Afternoon : 2 pm - 10 pm

✓ Evening : 10 pm - 8 am

✓ Overlapping hours : 2 pm - 4 pm

For nurses, HCA and housekeeping staff

✓ Morning : 7 am - 3 pm

- ✓ Evening : 3 pm - 11 pm
- ✓ Afternoon : 11 pm - 7 am

Visiting hours: 11 am – 1 pm and 5 pm – 7 pm

- ✓ Only 1 relative at a time is allowed

Records and Registers

- Admission and discharge register
- Handing and Taking over/Team leader sheet
- Assignment book
- Leave book
- O.T booking register
- Critical care flow sheet
- Narcotic drug register.

Equipment:

MONITORING EQUIPMENT	**CARDIOVASCULAR THERAPHY**	**RESPIRATORY THERAPY**	**LABORATORY EQUIPMENT**
Bed side and Central Monitors ECG Recorder Pulse Oximeter Spirometer	CPR Trolley Defibrillators Infusion Pumps and Syringes	Ventilators Intubation/ Tracheostomy Trolley Nebulisers	Blood gas Analyser Electrolyte Analyser

ECG Monitor Temperature Monitors Blood Glucose Meter			

Miscellaneous Equipment

- Crash Cart
- Dressing trolley
- Procedure trolley

Management Information System

ICU	***LOS (days)***
Adult ICU	4
PCICU	6.5
PICU	5.6
NICU	6.4

PAEDIATRIC INTENSIVE CARE UNIT

The PICU looks after all critical pediatric patients. It is located on 8th floor. The ICU is split into 2 zones for outpatients and inpatients. The various other rooms include Ante room, equipment room, clean utility and dirty utility room. The average length of stay of each patient is approximately 1 week.

NEONATAL INTENSIVE CARE UNIT

The NICU is 18 bedded and located on the 8th floor. The department is divided into 2 zones – outpatients and inpatients. There are 2 isolation rooms. The nurse ratio is 1:1

DEPARTMENT OF RADIATION ONCOLOGY

The department of radiation oncology at KDH is a state of the art unit having the latest technology and equipped personnel, delivering services of international quality. The department has the first installed TRIOLOGY and NOVALIS Tx in the country. It is capable of performing all the high end treatment like IMRT, IGRT intracranial stereotactic radio surgery and radiotherapy, extra cranial sterotaxy, total body radiation, total skin electron treatment. There is a facility of brachytherapy for all sites in the form of remote afterloadingHDR brachytherapy system with 3D planning facility. The department works in close coordination with surgical oncology and neurosurgical subspecialties' (e.g. head and neck, thoracic, breast, urology and gynae oncology, neuro-oncology) maintaining a high quality evidence based practice for the particular sub suite.

CENTRE FOR REHABILITATION

- The centre is located on a dedicated floor with 30,000 square feet area and exclusive inpatient service, first of its kind.
- The department is located on 7th and 8th floor of hospital.\
- It has got its own billing desk.
- It also consists of a day-care centre for those patients who need 4-5 sessions in a day.
- **Staff of the department consist of**

HOD

↓

40 physiotherapists

↓

1 Asst. nurse

↓

3 Nurses

↓

5 HCA

- **Following therapy services are available :**

1. Neurological Rehabilitation
2. Musculoskeletal rehabilitation
3. Cardiac Rehabilitation services
4. Pulmonary Rehabilitation
5. Paediatric Rehabilitation
6. Cancer Rehabilitation
7. Pain management
8. Women's health
9. Geriatric Rehabilitation

The therapy services offered in the department:

1) Physical therapy
2) Occupational therapy
3) Electrotherapy
4) Speech and language pathology
5) Exercise physiology
6) Psychology
7) Rehabilitation nursing
8) Orthosis and prosthesis

IVF CENTRE

- Centre for reproductive endocrinology and fertility (CREF) is located on the 7th floor of the hospital and has dedicated space for out-patient care and day care of patients with infertility and reproductive endocrine problems, and for medical acupuncture and mind body program.
- CREF is staffed by a full time consultant reproductive endocrinologist and infertility specialist, embryologist and infertility issues and a health care assistant.
- A full-fledged laboratory and radiology department offering a comprehensive range of tests including some newer cutting edge tests under one roof only compliments our services at CREF, but is also extremely convenient for patients.
- Medical conditions addressed at CREF:
  - ✓ **Reproductive endocrinology**
  - ✓ **Midlife health care**
  - ✓ **Bone health**
  - ✓ **Adolescent gynaecology**
  - ✓ **Infertility treatment**
    - ❖ Fertility drugs to induce / enhance ovulation (pills or injections)
    - ❖ Intrauterine insemination
    - ❖ Assisted reproductive therapy (ART) procedures:
      - In vitro fertilization (IVF)
      - Intracytoplasmic sperm injection (ICSI)
      - Assisted hatching(AH)
      - Blastocyst transfer
      - Pre-implantation genetic diagnosis (PGD)
      - Embryo cryopreservation
      - Sperm cryopreservation
      - Testicular tissue cryopreservation
      - Third party reproduction
        - Donor oocytes

- Donor sperm
- Gestational surrogacy
- Donated embryos

- Other facility:

✓ Diagnostic tests
✓ Billing and registration
✓ Phlebotomy services
✓ Ultrasound facilities
✓ Andrology and embryology laboratories
✓ Operating room, pre-op and recovery room facilities
✓ Counselling and support services

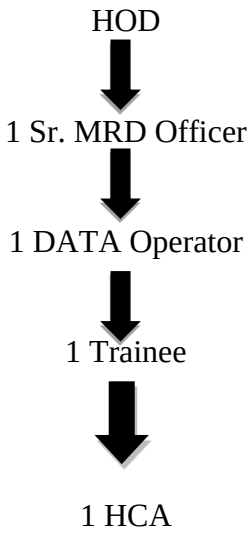
CLINICAL SUPPORT SERVICES

MEDICAL RECORD DEPARTMENT

- The main functions of the department are :

1) Storing file for future reference.
2) Research.

- Staff:



- Open and close audit is done of all files before keeping them storage.
- The arrangement of files is done in following ways-
  - ✓ Year wise and UHID wise.
  - ✓ Also on the basis of their type :
    a) Regular files
    b) DAMA files
    c) MLC files
    d) OT recovery files
    e) Chemotherapy files
    f) Dialysis files
- Apart from files few forms and records are also store in this department:

- ✓ Consent form
- ✓ OT papers
- ✓ A&E papers

- Certificates issued from the department :
  - ✓ Patient fitness certificate
  - ✓ Fit to fly certificate
  - ✓ Leave certificate
- All files are stored in the department for the following time period:
  - ✓ Reports -1.5years
  - ✓ Death, DAMA & MLC files 20 years
  - ✓ Regular files-5years
- ICD-10 coding is done for storing files:
  - ✓ Red-Death, DAMA & MLC
  - ✓ Black-Oncology
  - ✓ Yellow-Gynecology& obstetrics, IVF files
  - ✓ Dark blue-General medicine, critical care, Nephrology, Endocrinology, Gastroenterology, Pulmonary medicine, Dermatology, Dental, Psychiatry, rehabilitation, Rheumatology.
  - ✓ Light blue- Pediatrics
  - ✓ Orange- Neurology, CVTS, Cardiology, orthopedics
  - ✓ Green-ENT, general surgery, ophthalmology, Urology, Cosmetology, Interventional radiology.
- This department has to notify Bombay Municipal Corporation(BMC) about following things on regular basis:
  - ✓ Birth and death report (once in a week).
  - ✓ Notifiable disease which includes cholera, dengue, plague, yellow fever, TB, polio, meningococcal meningitis, leptospirosis, viral encephalitis (once in a week).
  - ✓ Maternal mortality (once in a month)
  - ✓ MTP &PNDT (once in a month)

- Retrieval- for easy retrieval of files tracer cards are used when files are given to patients or sent outside the department.

LABORATORY

The salient features of the department are as follows-

- CAP (College of American Pathology) accreditation
- Central processing laboratory is spread over 40,000sq. Ft. which follows strict internal quality compliance for all analyzer.
- Exhaustive menu of tests from routine to esoteric.
- Excellent laboratory management system which handles both pre-analytical and post-analytical aspects.
- Dedicated courier and logistic services
- 24 hrs. sample collection facility
- Stringent quality control monitoring which satisfy the quality assurance elements elaborated by GLP and GCP and readily available documented evidence of quality assurance and quality proficiency schemes.
- Constant improvisation and technology innovation using over 150 state of the art equipment.
- Quality control and quality assurance executive that monitors pre-analytical and post-analytical processing of the samples.
- Customized management report (MIS-management information system)
- An active IRB and ethics committee which oversees clinical trials proposed when required.

BLOOD BANK

Transfusion medicine is a multi-disciplinary area concerned with the appropriate use of blood and blood components in the treatment of human disease. The mission of KDAH is to make available appropriate adequate quantity and high quality of safe blood and blood component to “anyone, anytime, anywhere” in medical community. KDAH adheres to quality norms and focus on the donor satisfaction standards and technique and quality control are precisely and meticulously maintained as per norms given in the drugs and cosmetics acts, by the regulatory authority, director drug controller (India), ministry of health and family welfare, Govt. of India, and also internationally recommended methods. The department runs round the clock and blood and its products are supplied as and when requested. Blood donation is accepted from voluntary blood donors and relatives and friends of the patient. Autologous blood donation (blood donation for one’s own use) is also accepted. The blood donors are informed and educated about the infections transmitted by transfusion of blood components 100% of collected blood is processed into component like red cells concentrate, platelet concentrate, fresh frozen plasma (FFP) and cryoprecipitate. The use of the components is better and cost effective. The blood bank at KDAH is equipped with state of art equipment, which enables use of advanced techniques for processing/screening of blood and its components. All the mandatory screening for the transfusion transmissible disease like HIV, HBV, and HCV is done with the more sensitive and specific CMLIA and ELISA methods. All units are screened for VDRL and malaria parasite. Red cells in an additive solution (RCA) like, SAGM or ADSOL is a product which is used in variety of indication like surgeries, anemia, trauma, child birth etc. as a thumb rule one unit would increase the hemoglobin by 1 gm.%.

IMAGING

The imaging department consists of radiology services. The investigations performed in these departments include:

- CT Scan
- MRI
- X-Ray
- Ultrasonography
- Mammography

The HIS has a system for appointment scheduling for each of these investigations. The appointments are given by Call Centre. There are 4 X-ray machines, 5 ultrasonography machines, 1 mammography machine, 1 CT Scan machine, and 2 MRI machine of which one is 3 Tesla located in the radiology department and the other is 1.5 Tesla IMRIS (intraoperative magnetic resonance imaging suit) is a movable machine attached to the ceiling that is located in the OT. It is basically used for MRI scanning during a surgery. They are working on its complete utilization.

CENTRAL STERILE SUPPLY DEPARTMENT

The central sterile supply department (CSSD) plays a key role in providing the items required to deliver quality patient care. Centralizing the reprocessing of reusable devices helps ensure uniform standards of practice, while also providing for improved workflow (soiled, to clean, to sterile). This also facilitates the training and education of skilled technicians who must be aware about the standards, complexities, challenges, risks and technicians associated with the CSSD function. Every CSSD task must be performed for the welfare and safety of patients, co-workers and the community.

CSSD is the heart of hospital infection control and the most important unit of clinical support services. CSSD's main functions are cleaning and drying, assembly, packing, sterilizing, storing and distributing instruments (both multi use and single use devices), as per well delineated protocols and standardized procedures.

INFRASTRUCTURE

It is divided into 3 zones

1. Decontamination area
2. Assembly area
3. Sterile storage area

STAFF

1 manager / department head

1 executive

1 senior technical officer

4 technical officers

6 junior technical officers

10 trainees

16 health care attendants

MAJOR TECHNOLOGIES

Ultrasonic cleaner

Washer disinfectant

Dryer

Steam sterilizers

Plasma sterilizer

ETO (ethylene oxide gas sterilizer)

Dry heat sterilizer.

RECORD MAINTAINED:

- Manual issue and receiving OT
- Manual issue and receiving all departments
- Sterilization records

PHARMACY

Central pharmacy indents to IP, OP and LB. it is of 2 categories: capital and consumables.

SCOPE OF INVENTORY MANAGEMENT:

- INDENTATION
- RECEIVING
- STORING
- DISTRIBUTION

The staffs consist of:

- 5 manager
- 1 executive
- 8 senior officers
- 24 officers
- 7 junior officers
- 6 trainee assistants
- 1 trainee HCA
- 16 attendants
- 21 HCA

HOUSE KEEPING

The objective of housekeeping is exceptional standards of cleanliness, sanitation and hygiene of the entire hospital. Housekeeping services are outsourced to ARA MARK services.

The staffs include:

- Housekeeping manager
- Assistant manager
- Housekeeping executives
- Supervisors
- Houseboys &house girls

Functions of housekeeping department are:

- General facility cleaning
  - ✓ Routine cleaning of patient's rooms
  - ✓ Patient's common areas
  - ✓ Washrooms
  - ✓ OT
  - ✓ Laboratory
  - ✓ Consultant's office
  - ✓ Glass windows and doors
  - ✓ Ceiling etc.
- Handling of biomedical waste.
- Pest control-It includes spraying every 24 hours for mosquitoes, cockroaches, flies, rats, lizards and termites.
- Garbage disposal- The housekeeping staff collects garbage collected in specified color coded bags from all garbage bins existing inside the hospital premises and disposes the garbage at the designated area within the hospital, which is the biomedical waste room. The general waste is sold to the junk dealer and healthcare waste is handed over to government approved vendor "synergy waste management".

- Horticulture- It is responsible for maintenance of in house plants & terrace gardens, flower arrangement during hospital functions.

The performance indicators are B.M.W. color code compliance, B.M.W. collection, pest control efficiency and sanitization of the hospital premises.

CLINICAL ADMINISTRATIVE SERVICES

STORES

Material stores functions in order to supply the right material in right quintiles at the right time at the right price. The IP departments put up requests for the required materials by uploading indents in the HIS. The store manager raises a purchase order to be sent at the central procurement stores. The supplies received are inspected on the basis of quantity and expiry in the incoming material inspection area. The items are stored as per the storage norms. Departmental issues are made for non – medical consumables as per requirement. Stock is reviewed periodically for non-moving items and short expiry items. Stock audits are carried out twice/year. Any variance is reported to the higher management. For inventory control, ABC and VED analysis is carried out. FEFO (first expiry first out) is followed. The staff includes:

- Assistant Manager
- Executive store
- Assistants
- 2 Health care assistants

The key performance indicators are no stock outs, zero errors in maintenance of accounts, zero error in billing processing, maintain minimum inventory maximum efficiency, maintaining stores as per the NABH = ISO standards, submission of bills accounts within 4 working days, expired items on the shelves should be zero, minimize emergency purchase, TAT suture and lab kits (19 days), instruments (8 weeks) and other items (2 days)

LINEN AND LAUNDRY

The objective linen and laundry is the availability of clean uniforms for patients and staff. Soiled linen when collected is kept in the dirt utility room in a hamper trolley. Infected linen are collected and put in a red bag at the source4 of generation. The red bag is sealed and labelled for infection. At the end of each shift, the dirty utility linen is carried in the hamper trolley to the collection room. At the collection point, it is segregated, counted, and sent to the laundry for washing. The performance indicators are laundry pending, turnaround time for laundry cleaning, percentage discarded linen.

BIOMEDICAL ENGINEERING DEPARTMENT

The main objective of the department is to facilitate the usage of latest technologies in the diagnosis, treatment and care of patients. It is also responsible for proper usage and quality performance of these costly equipment and tools inside the hospital

The department maintains an updated asset register of the hospital equipment, conduct daily rounds to ensure that the equipment is functioning smoothly, responsible for facilitation and identification of equipment requirements, planning technical comparison, ordering installation and deployment units and new projects, conduct regular preventive maintenance servicing for all the equipment at regular intervals, facilitating equipment replacements and condemnation, whenever required, conducting regular training programs for hospital staff, on usage of hospital equipment. The staffs consist of HOD, 5 biomedical engineers and 2 biomedical technicians and 4 medical gas technicians.

FOOD AND BEVERAGES

The objectives of food and beverages department are to deliver healthy and nutritious meals coupled with a wonderful experience of hospitality services to all IP, OP and staff. The cafeteria is outsourced to Java Green. The main functions of the department are as follows:

- Inpatient meal management
- Purchase of fruits, vegetables, milk, pulses, whole grain and other dietary consumables
- FIFO is followed

The purchased items are unloaded in the receiving area, where they are inspected and then washed with water and anti-bacterial liquid before bringing it in the kitchen premises. It is followed by storage of perishable and non-perishable items in refrigerator and dry storage area respectively. Diet planning and counselling is done by the dietician according to the patient's condition, food allergy and taste and general preference. The diet summary is handed over to the supervisor in the form of meal sheet cum ticket. According to this, the food is prepared and laid out on trays. The meals are served in the patients' rooms and clearance is carried out after 2 hours. Food/meal/diet for a patient admitted in the hospital is decided by the doctor admitting the patient depending on his/her medical condition. On doctor's recommendations, the dieticians plan the meal that is best for the patient's speedy recovery. The staff includes:

- Regional head of support function
- F&B manager cum chef
- Assistant manager F&B
- Executives
- Senior Dietician
- Other F&B staff

SECURITY

Services rendered by security department are surveillance and patrolling of the infrastructure and material, access control (in restricted areas like IT, MRD, LSS, Mortuary, Pharmacy, Electric control panels), control of movement of traffic in premises, reception and conduct of visitors and attendants, assistance in fire control and emergency plan, vigilance and intelligence, liaison with sensitive areas, carry out verification, hold records, issue passes, and generate reports on security matters. It is equipped with modern equipment like CCTV's metal and explosive detectors, alarms, security, lighting and walkie-talkies,etc. The staff members are:

- HOD
- Senior officer
- Security supervisor
- Sr. security assistant
- Security guards

The performance indicators are TAT, theft percent, code related incidents.

EDUCATION AND TRAINING FACILITIES FOR NURSES

In line with the vision of continued commitment toward education and training in the field of healthcare, particularly the preparation of highly competent nursing professionals dedicated to patient care, the board of management has upgraded its School of Nursing to a full KDA College of Nursing.

ADMINISTRATIVE SERVICES

ADMISSION AND BILLING

The admission and billing staff includes 1 H.O.D. and 12 employees. The services offered by the department are registration of a new patient, booking/reservation-bed and O.T, admission, billing, discharge work.

Front office

The front office is the first point of contact at KDAH. It is manned by duty manager, deputy duty manager, and patient care executive and patient care coordination. There are total 7 front offices in KDAH and there are 2 help desks.

Functions:

- Respond and answer telephone calls from patients and clients (call center).
- Registration of outpatients, in patients and executive health checkup patients for various investigations (registration counter).
- Admission, billing and discharge of in patients.
- Direct the patients and their relatives to the outpatient services and the inpatient wards (helpdesk and welcome desk).
- Report receiving and handling over to the patient (dispatch counter).

Third Party Administrator Desk

T.P.A. staff includes one executive clinical administrator and 4 Customer care officer.

Functions:

- Counselling.
- Pre-Authorization.
- Cashless admission.
- Query handling.
- Final approval.
- Maintain privacy and confidentiality.

INFORMATION TECHNOLOGY DEPARTMENT

It is implied that there is central database for entire hospital. Services rendered by the IT department are as follows:

- IT support to location users for hardware and software as per SLA (service level agreement).
- Installation of new IT equipment.
- Helping biomedical department in configuring the medical equipment with HIS.
- Installation of appointment scheduling programs.

The IT staffs include:

- Chief information officer
- Manager IT
- Executive IT engineers.

The performance indicators are calls resolutions within a time limit, strict data security, zero percent variance, in hardware and software variance, minimal occupational hazard and proper e-waste disposal.

ENGINEERING DAPARTMENT

Engineering and maintenance department is manned for 24 hours for keeping round the clock vigil on proper functioning of plant engineering equipment coming under the purview of department. This covers maintenance of major supplies to the hospital such as power, water, which form the life line to the hospital's activities. The responsibilities of the department include operation and maintenance of plant equipment installed in the basement of main building and various other areas to support the normal functioning of the hospital and repair work of equipment related to the department's responsibility. The policy of the department is to serve well with safety and it time, continuous improvement, cost saving, optimum utilization of manpower and equipment, optimum utilization of inventory and teamwork.

The major engineering services are:

- Electrical power supply- normal and emergency
- Air conditioning, ventilation and refrigeration.
- Steam and hot water supply.
- Water stations and cold water supplies- filtration system.
- Medical gases supplies
- Fire detection alarms and fighting system.
- Internal and external plumbing system.
- Civil works-Masonry, carpentry, glasswork, upholstery, painting, etc.
- PNG and LPG supply.
- Safety assessment of facilities.

MARKETING AND SALES

Marketing and sales department is concerned with business development, branding, promotions and advertisement of KDAH healthcare services. Marketing deals with organizing health check-up camps and awareness talks for corporate or PSU's and RWA, designing all the brochures and signage, conducting CME's/seminars. The sales department deals with PSU's and corporate tie-ups, pitching referral sales from nearby general practitioners and nursing homes, liaison with TPAs and managing the international patients (medical tourism).

FINANCE

The scope of services includes the entire hospital cash handling and cash disbursement in the form of salaries and vendor payment for stores, pharmacy and biomedical department. All the cash collected is deposited on daily basis n the bank. The TPA payment is collected through lump sum amount in the form of cheque at the end of the month. The staffs include :

- HOD
- Asst. Manager
- Senior executives
- Junior executives
- 2 cashiers

PURCHASING DEPARTMENT

Purchasing department is responsible for the procurement of function of the hospital the primary functions of the purchasing department are to:

- Procure the rights and services from the right suppliers at the right time for the right place.
- Receive, warehouse, issue $ distribute stocks to hospital departments in accordance with KDH procedure.
- Hospital users and clinicians actively participate in product evaluation processes. The purchasing department is actively involved in cost analysis and supplier performance management. It is through all of these activities that the department manages the chain process.

HUMAN RESOURCE DEPARTMENT

The functions of HR department at KDA hospital are:

- Hiring
- Physician and nurse recruitment
- Employee orientation
- Personal management
- Benefits and compensation management
- Counselling
- Claims handling
- Training and performance monitoring
- Professional development programs
- State and federal regulations education
- Work place safety and sanitation
- Administration – employee meetings
- Staff morale and retention

Recruitment /selection:

- Identifying the key requirements areas(KRA)
- Drafting job description
- Recruitment through job portals and internal references
- Selection
- Medical examination of the candidate
- Offering letter to the selected ones

QUALITY CONTROL DEPARTMENT

The Functions of the department are:

- To analyze patient feedback forms.
- To analyze different parameters from different departments and compare them.
- Infection control of the hospital.
- Induction and training of hospital staff.
- Accreditations (NABH, JCI).

This department also maintains few quality indicators for hospital:

- Medication Errors
- Return of patient within 72hours.
- Return of patient to OT within 48hours.
- Return of patient to ICU within 48hours.
- Number of Needle sticks Injuries.
- Number of blood transfusion reaction.
- Number of Adverse Drug reaction.

Staff:

This department consists of one quality manager who reports directly to the director of hospital.

PROJECT REPORT

Introduction

An emergency department (ED), also known as accident & emergency (A&E), emergency room (ER), or casualty department, is a medical treatment facility specializing in emergency medicine, that is, acute care of patients who present without prior appointment. Patients coming to A&E department either reach directly or make a call for ambulance or enquiry before coming to the hospital. The emergency department is usually found in a hospital or other primary care centre.

Due to the unplanned nature of patient attendance, the department must provide initial treatment for a broad spectrum of illnesses and injuries, some of which may be life-threatening and require immediate attention. The emergency departments of most hospitals operate 24 hours a day, although staffing levels may be varied in an attempt to reflect patient volume. It has come to notice that despite the recruitments, staffing at A&E departments remains "insufficient to deal with the rising numbers of patients seeking urgent and emergency care". Efforts to encourage patients to seek assistance over the phone or to go elsewhere over the past years have not reduced the flow of people to A&Es. (1)

This study is mainly focused on streamlining the current Process of phone calls coming to the Accident and Emergency Department of Kokilaben Dhirubhai Ambani Hospital, Mumbai using Lean-Six sigma management approach.

Lean Six Sigma approach to business process improvement helps companies distinguish themselves from competitors by manufacturing products with less waste, faster, better and at lower cost. Lean Six Sigma is a methodology, when it implemented properly the company improves efficiency and gain competitive edge. (2)

The concept called "lean management" or "lean thinking" is most commonly associated with Japanese manufacturing, particularly the Toyota Production System (TPS). Much of the TPS

way of thinking is based on the work of quality guru W. Edwards Deming, who taught, among other things, that managers should stop depending on mass inspection to achieve quality and, instead, focus on improving the production process and building quality into the product in the first place. Simply put, lean thinking means using less to do more.

Motorola was one of the first U.S. companies in the 1980s to implement a continuous process improvement methodology. Motorola started what eventually became Six Sigma in 1986 in an effort to catch up with the Japanese. Six-Sigma evolved as a total quality management system in which process improvement was a continual goal, not just implemented when vendors or customers decried poor quality. Ford became the first major auto manufacturer to adopt Six Sigma in 2000.

Lean Six Sigma, also called Lean Sigma, is a fusion of lean engineering with Six Sigma quality. The concept of Lean Six Sigma can be traced to Michael George, author of the 2002 book "Lean Six Sigma: Combining Six Sigma with Lean Speed". Lean Six Sigma has adopted the terminology and belt rankings of Six Sigma. (3)

Figure 1: History of Lean and Six-Sigma

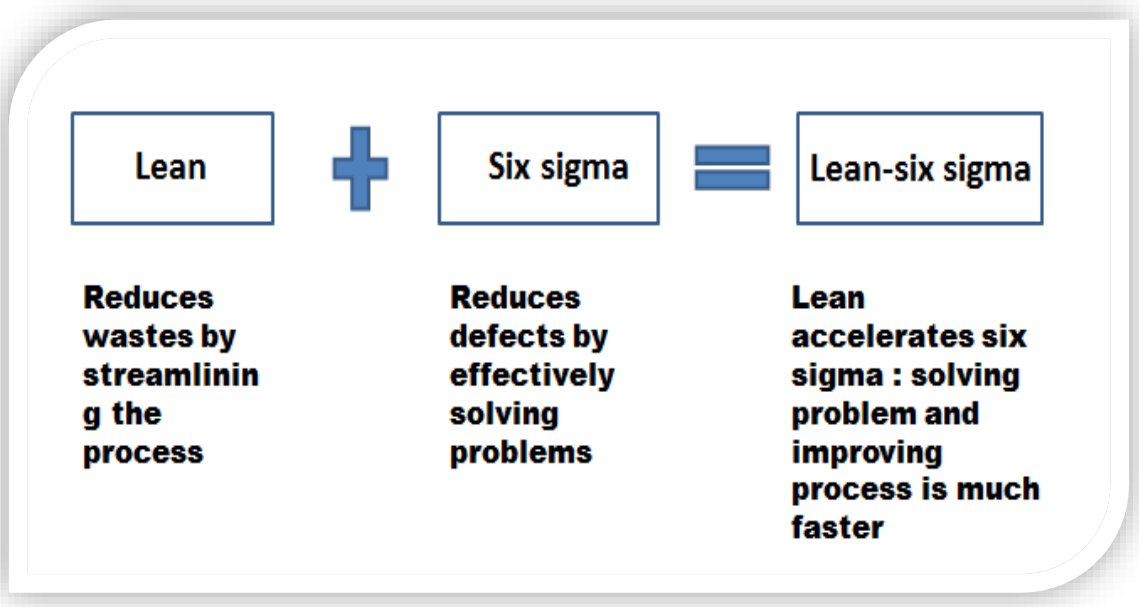
Emergency departments (EDs) play an important role in a patient's treatment cycle. Not all patients arriving at the ED are equally sick. Patients usually arrive at the ED via ambulance, car, or on foot, depending on their health conditions. Some patients are in critical condition, and saving their lives is a matter of time. Other patients are badly injured as a result of road traffic accidents (RTA), so their situations might be equally critical and in need of urgent treatment. Thus, time is a significant factor in saving lives when patients arrive at the ED. (4) Customers if they make phone calls before reaching the A&E department contribute towards relevant phone calls received at A&E department. If Phone calls are received other than the reasons related to A&E department, they contribute to the irrelevant phone calls at A&E. Calls at A&E department of KDAH come from customers, patients(from outside the hospital), nurse and consultants(from within the hospital).

When a customer's calls to A&E Department or call centre of KDAH for enquiry, they have no idea what kind of experience they are going to have. The call centre personnel, CCO or nurse could be empathetic, or downright surly. The caller might reach an experienced CCO or nurse who knows how to solve the problem, or brand new personnel who is not fully prepared. They may speak to someone who is easy to understand, or someone with a barely intelligible accent. The customer may have the pleasure of speaking with a conscientious, attentive individual, who will go through all the required steps, or one who is distracted or burned out and quick to cut corners in order to get off the call. This type of variation can cost KDAH real money.

But the true cost of poor quality (COPQ) is like an iceberg – the biggest costs are below the waterline. For example, there are somewhat hidden costs associated with not adhering to the defined call handling process. These are the costs that won't show up on the budget but that will affect the KDAH's bottom line.

A final type of invisible costs is the effect of variation on the customer. Customers don't experience average of the information delivered to them; they experience its variation. And when that experience is bad, it can create detractors who can fail to renew or buy again and who speak out about their experience to friends or on social networking sites – or even post calls on social networking sites. Measuring these kinds of costs has always been difficult, but that does not make them less real. The Stanford MBA students were asked to rate their impression of the brand after one phone interaction. Fifty percent walked away with a negative brand impression.

Figure 2: Lean six-sigma in health care



Literature review

The purpose of the Literature Review is to analyse relevant journals, books, related researches, and then make improvements by applying Lean Six Sigma approach to improve the process. From the Literature survey we have found many articles which are related to using Lean Six Sigma to improve system and decrease the irrelevant phone calls. We got an insight in to the Lean Manufacturing and Six Sigma methodologies. Based on observation and with assistance of above mentioned guidelines, we were able to address the root causes of problems in the process of phone calls received at A&E department and recommended some solutions and alternatives which will lead to more optimized processes hence it will enhance the operational system, eliminate different type of waste, and increase the profit.

With increasing competition, expanding globalization and demanding customers, the playing field in the service call centre industry has changed rapidly, as phone banks have evolved into multichannel contact centres. Many organizations have realized that the key for survival is efficiency and effectiveness, with a focus on productivity and customer experience.

Healthcare call centres have typically been viewed as cost centres and therefore are now at risk of closer scrutiny. While most organizations might be inclined to slash the positions, the opportunity exists to focus on customers and process that add value to the telephone encounter. Elimination of waste or non-value will create greater efficiency in the call process. (5) This in turn helps develop greater trust in brand, higher customer satisfaction and greater inflow.

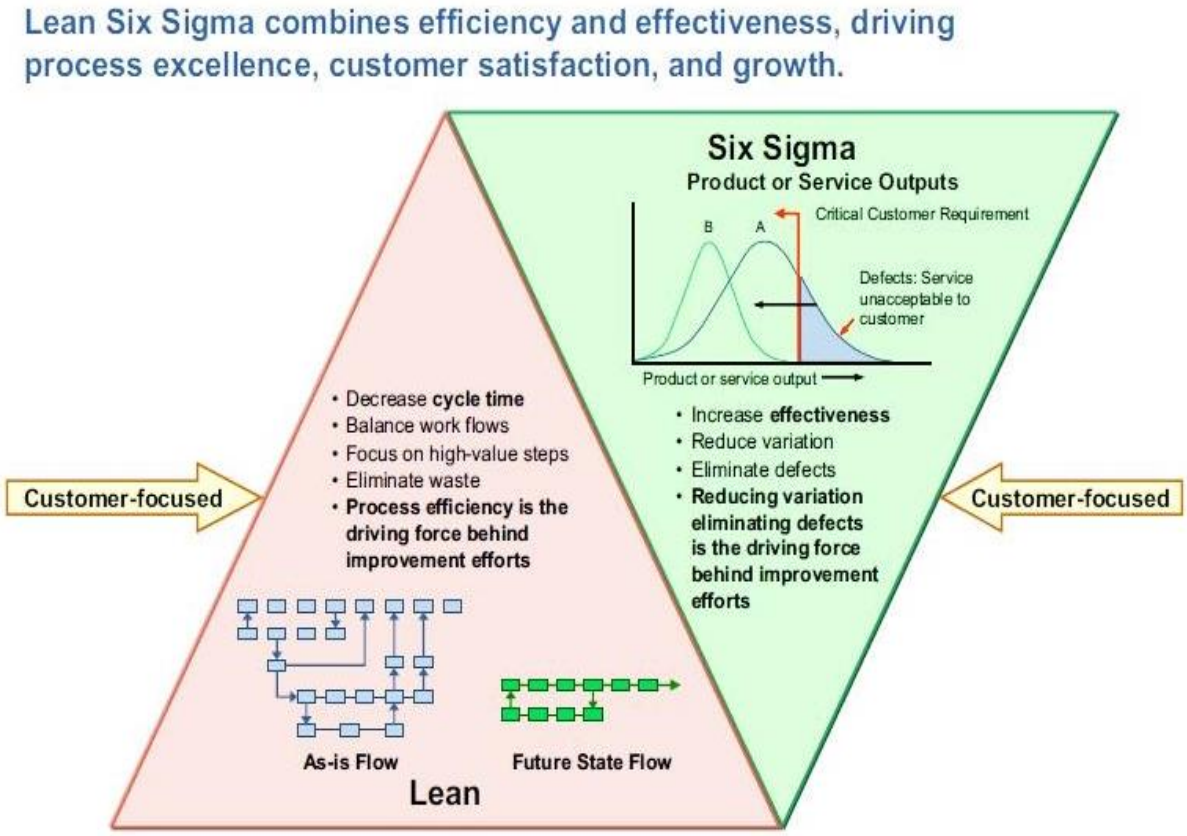


Figure 3: A model of Lean six-sigma in health care

During the last decades, various lean approaches have received much attention and have been successful in improving the productivity, especially in manufacturing, but also other industries perhaps most notably healthcare. (6)

A model of Lean in health care, proposes that

(a) Lean affects patient care and employees indirectly by changing work structure and process
(b) Lean affects employees directly
(c) Employee and patient care changes can affect one another, and
(d) Lean is implemented in a particular context and that the success of Lean is contingent on how a particular Lean implementation fits into the local context. (7)

The concept of quality in Six Sigma implies that customers receive exactly what they want, without defects. (8) From a statistics point of view, Six Sigma's goal is to eliminate defects up to 3.4 defects per million opportunities (DPMO). Sigma level is used as a performance indicator in the healthcare service to indicate DPMO that are outcomes from a healthcare process. Principle of lean and six-sigma involves determining the needs of the customers of a product or service, and driving those needs into the product or service being created. The voice of the customer (VOC) is a key factor because the design of a new product or service process should consider customers' wants and needs, which is the ultimate objective of the design or redesign process. (9)

Based on the literature review, it emerges that Lean six-sigma can be successfully used to minimize the non-value added activities and achieve high quality standards that are expected from hospitals. It is a powerful approach to improve the process, reduce costs, increase business profitability, revenue growth and increase the customer satisfaction.

Purpose of Study

The study is conducted with an aim to reduce the number of irrelevant phone calls at A&E department at Kokilaben Dhirubhai Ambani Hospital, analyse the reasons for those calls and finally recommend solutions to minimize irrelevant calls to increase efficiency of A&E personnel for other A&E related relevant work. The study will also help find difficulties faced at each level of call receiving.

Objectives of Study

1. To study the existing process of receiving calls to A&E department of Kokilaben Dhirubhai Ambani Hospital, Mumbai.
2. To find out the current average of irrelevant calls to the A&E Department and sigma level of the process in place.
3. To identify value added and non-value added activities in the process and suggest steps to control the irrelevant calls to A&E Department of the Hospital.

The project focuses on decreasing irrelevant calls from 43/day to 15/day hence it improves convenience in functioning to sisters and staff of A&E department and more business in terms of more number of patients coming to the hospital because of more relevant calls being received. Also the project focuses on improving the CP and sigma level of the process. Currently the hospital environment is not organized so things need to get clean up and organized. This Project addresses the root causes of problems in the process of calls at A&E department and recommends solutions and alternatives which should lead to more optimized call process and enhance operational system, eliminate different type of waste, and increase the profit.

Project Scope

The scope of the project is to reduce the number of irrelevant phone calls at A&E department of KDAH by application of Lean Six Sigma tools and techniques.

According to lean six sigma concept every business process improvement opportunity has relationship as Y= F(x). So we first define, measure and analyse the process Inputs (x) and sustain the process outputs (Y).

This projects aims to implement the Lean Six Sigma solutions at KDAH in nursing department, call centre and hospital IVR system. This will help the employees and associated value stream personnel to better understand the improvement opportunities and document the progress where they will be responsible for carrying out and sustaining the change.

Stages of Study

Lean is an integrated approach to utilizing capital, material and human resources to produce just what is needed, when it is needed, in the amount needed with minimum materials, equipment, labour and space. (10) Lean Six Sigma Seeks to improve the quality of manufacturing and business process by:

- Identifying and removing the causes of defects (errors) and variation.
- Identifying and removing sources of waste within the process.
- Focusing on outputs that are critical to customers.

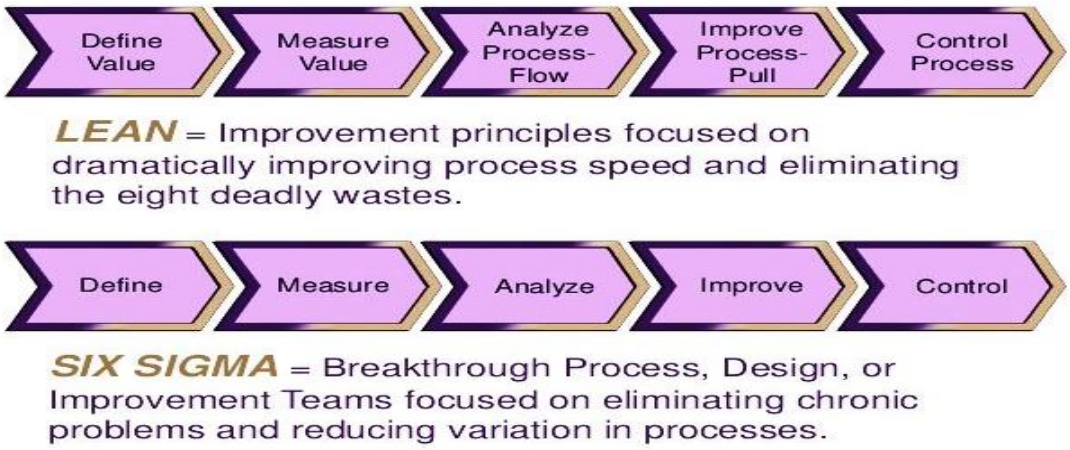


Figure 4: Figure showing Principles of Lean and Six-sigma

Identify Value / Define Phase

In the define phase, the project outlines, metrics, and objectives must be clearly identified. The project charter is a helpful tool in this context. It describes the project scope, goals, and anticipated benefits. (4)

Essentially the purpose of the Define step is to set your project up for success. Project managers are familiar with the things that need to be done when starting off a project. Essential project elements are accomplished in this step, such as:

- Establishing the project charter and appropriate scope
- Identifying stakeholders and team members
- Establishing team ground rules
- Planning and conducting a successful kick off meeting.

<table>
<tr><td colspan="5">Project Title : A lean six sigma study on irrelevant phone calls at A&E department at KDAH</td></tr>
<tr><td colspan="4">Problem Statement</td><td>Opportunity Statement</td></tr>
<tr><td colspan="4">To reduce the number of irrelevant phone calls at A&E Department.</td><td>Pain: High number of irrelevant calls coming to A&E.
Impact of pain: Inconvenience in functioning to sisters and staff of A&E department, loss of business in terms of less number of patients coming to the hospital because of calls not received, Loss of trust in KDAH brand in terms of efficiency.</td></tr>
<tr><td colspan="4">Goal statement</td><td>Project scope</td></tr>
<tr><td>Metric</td><td>Current level</td><td>Goal / Target</td><td>Target date</td><td rowspan="2">Process under improvement:
Starts with 5-05-2015
Ends with 30-05-2015</td></tr>
<tr><td>Per day irrelevant calls</td><td>43</td><td>15</td><td>30/05/2015</td></tr>
<tr><td colspan="4">Project plan</td><td rowspan="2">Limitations</td></tr>
<tr><td>Phase</td><td>Start</td><td>End</td><td>Remarks</td></tr>
<tr><td>Define</td><td>05-05-2015</td><td>10-05-2015</td><td>Completed</td><td>1)Time constraint</td></tr>
<tr><td>Measure</td><td>12-05-2015</td><td>17-05-2015</td><td>Completed</td><td>2) Implementation of process with involvement of top management.</td></tr>
<tr><td>Analyze</td><td>18-05-2015</td><td>21-05-2015</td><td>Completed</td><td></td></tr>
<tr><td>Improve</td><td>22-05-2015</td><td>23-05-2015</td><td>-</td><td></td></tr>
<tr><td>Control</td><td>25-05-2015</td><td>30-05-2015</td><td>-</td><td></td></tr>
</table>

Table 1: Project charter followed for the study at A&E department

In this project, irrelevant calls are defined as those calls received at A&E (reception or nurse station) which were not directly related to functions performed by A&E department.

To clearly identify the project charter's goals, surveys were distributed to a random sample of patients at A&E and around the hospital; CCO's and nurses at A&E Department and call centre personnel. The survey enabled to collect VOC comments in addition to the critical to quality (CTQ) factors. The survey analysis revealed that the main customer's voice is to reduce number of irrelevant calls to A&E department of KDAH. Therefore, the patient CTQ factors are

- Patient calls Directly for Enquiry through direct emergency number.
- Call center forwarded enquiry calls.
- Calls from sisters in wards for enquiries.

Table 2: Table showing Critical to Quality and Critical to Process indicators

	Critical to Quality		**Voice of customer**
			External Voice
	Patient calls Directly for Enquiry through direct emergency number.		Call not picked by the receptionist
			Phone always busy
	Call centre forwarded enquiry calls.		**Internal Voice**
	Calls from sisters in wards for enquiries.		Calls from sisters in wards for phone numbers and about other enquiries.
			Patient calls Directly for Enquiry through direct emergency number.
			Call centre forwarded enquiry calls.

			Consultant call from within the hospital for enquiry
Voice of business	**Critical to process**		
TAT of picking calls is high	Lack of awareness and information about hospital process		
Lack of awareness and information about hospital process	Poor inter departmental Coordination		

The project charter was reviewed several times, and a set of comments was modified after detailed discussions. The charter was then approved by the hospital management team. This approval gives full support to the team to achieve the required goal and offers a clear and well-organised vision.

The starting point is to recognise that only a small fraction of the total time and effort in any organisation actually adds value for the end customer (patients, sisters in hospital or CCO's). By clearly defining Value for a specific product or service from the end customer's perspective, all the non-value activities -or waste - can be targeted for removal. Through this principle we defined "value". "Value" is any action or process that a customer would be willing to pay for. We identified efforts that add value for the customers and hospital.

Table 3: Table showing COPIS diagram

CUSTOMERS	Outputs	Process	Inputs	SUPPLIERS
Customer	Receives info	**Customer calls**	Seeks info	System
System	Receives info	**System generated codes**	Seeks info	Customer
System	Receives info	**Customer presses 1/2/3/4/5/9**	Seeks info	Customer
-	-	**Call gets lost in the system cannot be tracked back**	-	-
Call center person	Receives info	**Customer care executive receives calls**	Seeks info	Customer
Customer	No info Received	**Call on waiting or not picked up by customer care executive**	Seeks info	Call center person
Customer	Receives info	**Call directed to A&E department**	Seeks info	Call center person

Call center person	Call answered	**Call directed to a specific departments**	Call directed by call center person	CCO/ Sisters

Customer	No info received	**Call not received at the specific department**	Seeks info	CCO
Customer	No info receives	**Customer calls at some specific department but dissatisfied with the information received**	Seeks info	CCO/Sister
Customer	Query resolved/not resolved	**Customer calls directly to A&E for more information**	Query / Request made	CCO/ Sisters
CCO at A&E department	Receives info	**Customer calls directly to A&E**	Seeks info	Customer
CCO at A&E department	Receives info	**Call received by CCO at A&E**	Seeks info	Customer
Customer	No info Received	**Call not received by A&E CCO**	Seeks info	CCO at A&E department
Customer	Customer dissatisfied	**CCO at A&E unable to solve the query**	Seeks info	CCO at A&E
CCO at A&E	Receives info	**CCO transfers call back to the call center**	Seeks info	Call center person
CCO at A&E/Call center person	Receives info	**Call directed to A&E nurse station**	Seeks info	Sister at A&E department

Sister at A&E department	Receives info	**Sisters call at A&E department for queries not related to A&E**	Seeks info	Sisters from across hospital
Customer		**Enquiry made**	Seeks info	Sister at A&E department
Customer	Receives info	**Missed call tracked/called back**	Seeks info	Call center person

Statement of Problem

Statement of problem is, to reduce the number of irrelevant phone calls at A&E Department of Kokilaben Dhirubhai Ambani Hospital, Mumbai.

Problem	Customer Impact	Business impact
High number of irrelevant calls to the A&E department	Customer dissatisfaction because of incomplete information delivered	Loss of trust in KDAH brand in terms of efficiency.
	Patient in A&E dissatisfied because of diverted attention of sisters and staff	Decreased service output at A&E department resulting in patient dissatisfaction.
	Number of important calls missed.	Loss of business in terms of less number of patients coming to the hospital because of calls not received.
	Increased waiting time for other calls	Loss of customers

Table 4: Table listing problem statement and possible problem outcomes at A&E department

Process Map / Measure

A Process Map is an organized visualization of all the interrelated activities which combine to form a process. A well understood process can be visualized easily and hence is easy to improve the process of calls received at A&E department and hence easy to work towards reducing the irrelevant phone call at A&E. The basic process was mapped for calls to A&E department are as depicted in the diagram below.

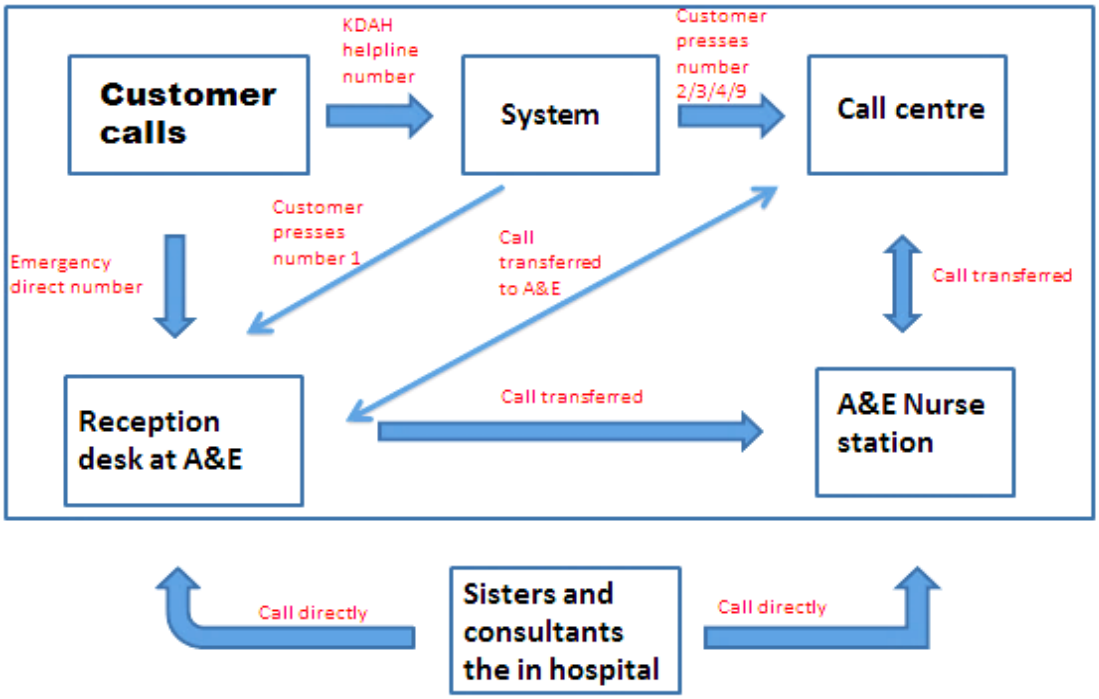


Figure 5: Figure showing A&E calls receiving process at KDAH

The Measure step is often a step which, unfortunately, is skimmed over by most teams. One of the biggest mistakes made when trying to improve results is to make decisions based on "gut" feeling, intuition or anecdotal information. Instead, what is imperative is to base decisions on facts and data and that is the main goal of the measure step. In the Measure step, the team should:

- Identify and operationally define key metrics
- Develop a data collection plan
- Conduct a measurement system analysis to verify that the data is accurate
- Stratify the data
- Establish baseline charts
- Make charts and graphs to help the team better understand what the process is currently delivering in terms of processing times, errors or defects (11)

Data Collection Plan

- **Data Measurement Method -** The number of calls received at A&E department was recorded using the data collection sheet as per Annexure A.
- **Measurement System Analysis -** The chances of repeatability error were avoided by using a standard data collection sheet.
- **Sampling Method –** The calls were reported for all the three shifts at the reception desk as well as the nurse station at A&E department.
- **Sampling Timeframe -** Data was collected for a period of seven days starting from 12thMay, 2015 to 17th May, 2015.
- **Sample Size –** A total of 313 calls calls were recorded for a period of seven days at A&E department.

Performance statistics for number of irrelevant calls for a period of seven days at A&E department of KDAH were recorded. Using the data collected average number of calls received per day, the lower and upper specification limit for irrelevant calls per day, standard deviation, Cp value, total number of defects, total number of opportunity in the process, defects per million opprtunity and sigma level for the process at A&E departemnt were calculated.

Cp= Process Capability. A simple and straightforward indicator of process capability. Cp should always be greater than 2.0 for a good process which is under statistical control.

defect - A vital and generic Six Sigma term for any failure in meeting customer expectation (internal and external customers) - any failure within the delivery process.

Opportunity- A Six Sigma opportunity is the total quantity of chances for a defect.

Defects per Opportunity – DPO

DPO = $Total\ number\ of\ defects\ /Total\ number\ of\ opportunity$

Defects per Million Opportunities - DPMO

DPMO = DPO x 1,000,000

Defects Per Million Opportunities or DPMO can be then converted to sigma values using Yield to Sigma Conversion Table.

According to the conversion table:

6 Sigma = 3.4 DPMO

Output	Average	Standard deviation	CP
Calls	52.5	23.38161671	0.099793499

Output	No. of units	No. of opportunities per unit	No. of defects	DPMO	Sigma Level
Calls	53	1	43	811321	0.62

- Sigma level and CP of less than 1 indicates that the process is not capable to produce defect free outputs resulting in high customer dissatisfaction. Sigma level is the metric that indicates how well a process is performing. Higher the sigma better the process.

Table 5: Table showing the data collected for irrelevant call process at A&E department

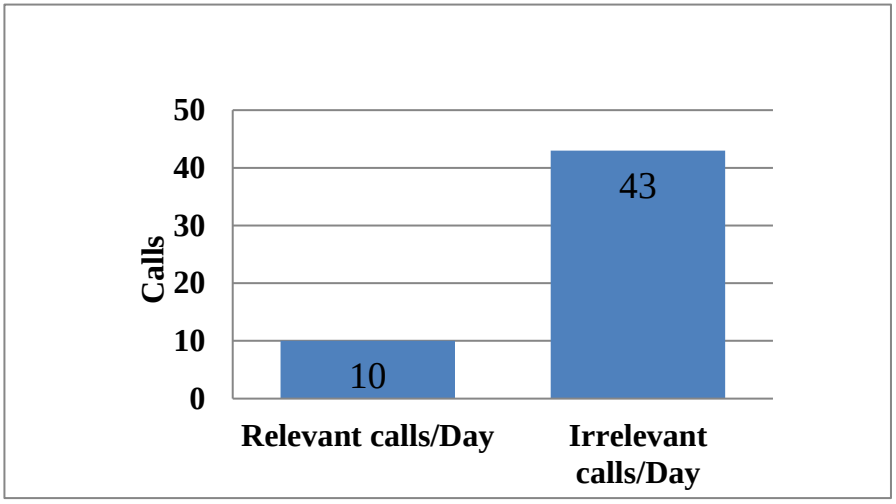


Figure 6: Chart showing the data collected for average call/day at A&E department

CT Matrix

Purpose is to identify the relationship between elements of the process (CT Tree-Process steps) and product tree (CTY tree-VOC's) at all level of the product tree hierarchy. CT matrix is a tool which is applicable to all areas of a business process. There are various benefits of CT matrix. These are as follows:

- It has the ability to recognize potential six sigma projects by identifying leverage processes;
- It is capable enough to link customer requirements directly to our processes at different levels;
- The prospect to envision process and capabilities of product when the tools of Six Sigma are being used and values of Sigma are planned.

Intersection point: Identifies the relationship between activity of a process and a product characteristics in terms of quality, delivery and cost at this level of the Product tree.

Process Steps		Customer calls	System receives call	Call directed to A&E department	Call center executive receives call through system	Call centre executive forwards call to A&E department	A&E executive receives the call and action taken	Call directed to A&E nurse station by CCO/call center
VOC's								
Call not picked by the receptionist	**7**	5	0	5	5	5	0	0
Phone always busy	**6**	5	0	5	5	5	0	0
Calls from sisters in wards for phone numbers and about other enquiries.	**8**	0	0	3	0	0	1	5
Patient calls Directly for Enquiry through direct emergency number.	**10**	0	3	3	0	0	5	5
Call centre forwarded enquiry calls.	**9**	0	0	5	0	5	5	5
Consultant call from within the hospital for enquiry	**5**	0	0	0	0	0	1	5
Total		65	30	**164**	65	110	108	**160**

Scale: 0=None, 1=Low, 3=Moderate, 5=Strong

Table 6: CT Matrix

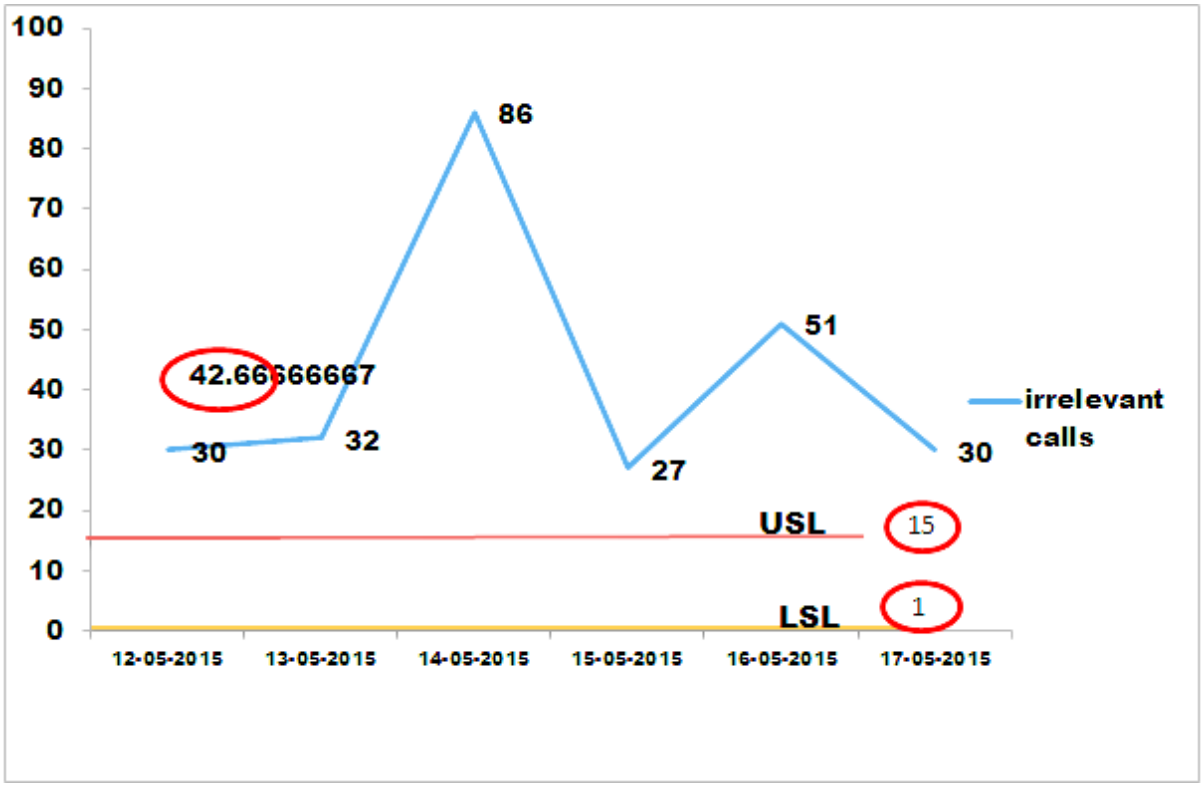


Figure 7: Control Graph for average call/day along with upper and lower specification limit at A&E department

Map the Value Stream

The Value Stream is the entire set of activities across all parts of the organisation involved in jointly delivering the product or service. This represents the end-to-end process that delivers the value to the customer. Once the organisation understands what its customer wants the next step is to identify how the organisation is delivering (or not) that to them.

"Value" and "Waste" were identified at this stage. "Value" is any action or process that a customer would be willing to pay for while "waste" is any useless consumption or expenditure or use without adequate return. Types of waste include: defects, overproduction, waiting, not utilizing, transportation, inventory, motion and extra processing.

Table 7: Table showing Value Stream Mapping of calls reaching A&E department

Steps	Value Added	Non-Value Added
Customer calls	Δ	
System generated codes	Δ	
Customer presses 1/2/3/4/5/9	Δ	
Call gets lost in the system cannot be tracked back		**Ø**
Customer care executive receives calls	Δ	
Call on waiting or not picked up by customer care executive		**Ø**

Call directed to A&E department	Δ	
Call directed to a specific departments	Δ	
Call not received at the specific department		**Ø**
Customer calls at some specific department but dissatisfied with the information received		**Ø**
Customer calls directly to A&E for more information		**Ø**
Customer calls directly to A&E	Δ	
Call received by CCO at A&E	Δ	
Call not received by A&E CCO		**Ø**
CCO at A&E unable to solve the query		**Ø**
CCO transfers call back to the call center		**Ø**
Customer calls to A&E and call directed to A&E nurse station	Δ	
Sisters call at A&E department for queries not related to A&E		**Ø**

Enquiry made	Δ	
Missed call tracked/called back	Δ	

Create Flow / Analyse

Creating flow focuses on what is flowing through the process. It eliminates bottlenecks and minimizes buffers. (12)

After mapping the Value Stream, we identified the Non Value added activities (Wastes). Eliminating this waste ensures that the product or service “flows” to the customer without any interruption, detour or waiting.

The Analyse step is all about getting to the root cause of the problem. Too often when trying to solve a problem, people or teams tend to focus on a symptom as opposed to the true root cause of the problem. The tools and techniques in the analyse step lead project teams to gather clues for improvement and ascertain what the root cause, or causes, are that are the most important drivers. The Y is a function of X formula is at play in the analyse step. A team will analyse the process, perhaps using value-added analysis, statistical analysis, or maybe a fishbone chart, a cause and effect diagram, to get to what they think are the root causes. Then the team would gather data on the root causes to determine if there is a cause and effect relationship with the problem. Verifying cause and effect is a crucial step in analyse phase; a step which many people, unfortunately, skip or simply take for granted based on their opinions. (11)

It was analysed through the data collected of the process that customers whose inquiries were not answered within a call would call back. This increased the call volume, inflated the numbers of calls that could not be resolved on the first call, and led to multiple calls to the hospital or A&E Department for the same problem. Also many consultants and nurses in the hospital called A&E department to make enquiries that could have been arranged from some where else.

Using direct observation, random listening to calls (recorded so as not to skew the activity on the call) and fishbone diagramming and analysis, some root causes began to surface.

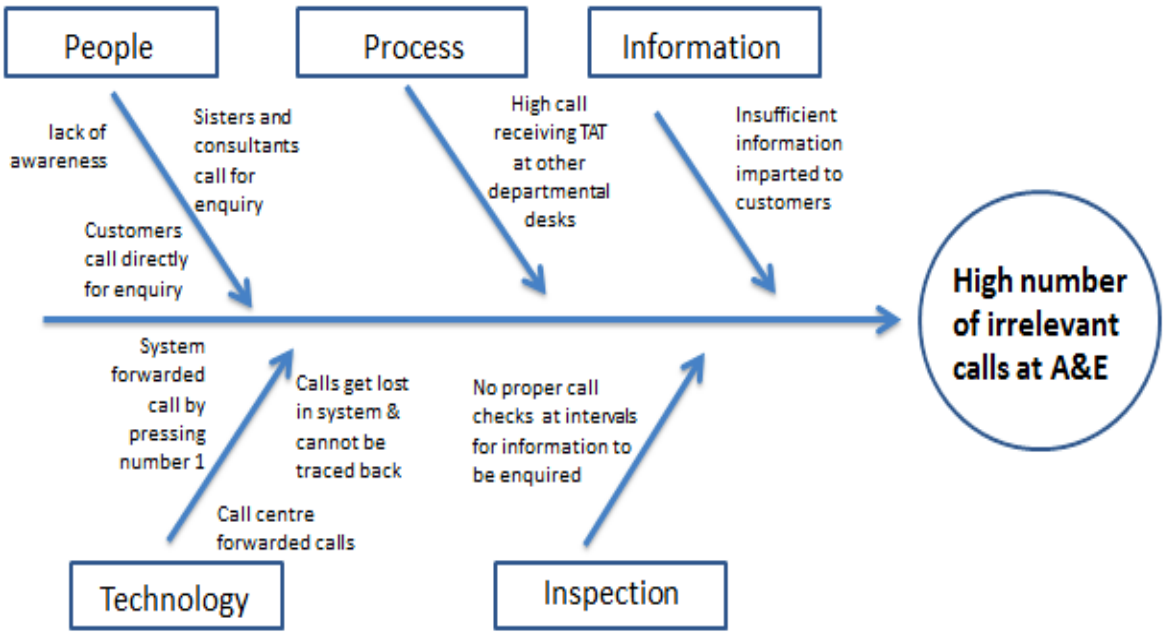


Figure 8: Figure showing Ishikawa diagrama(cause and effect analysis) for high number of irrelevant calls at A&E department at KDAH

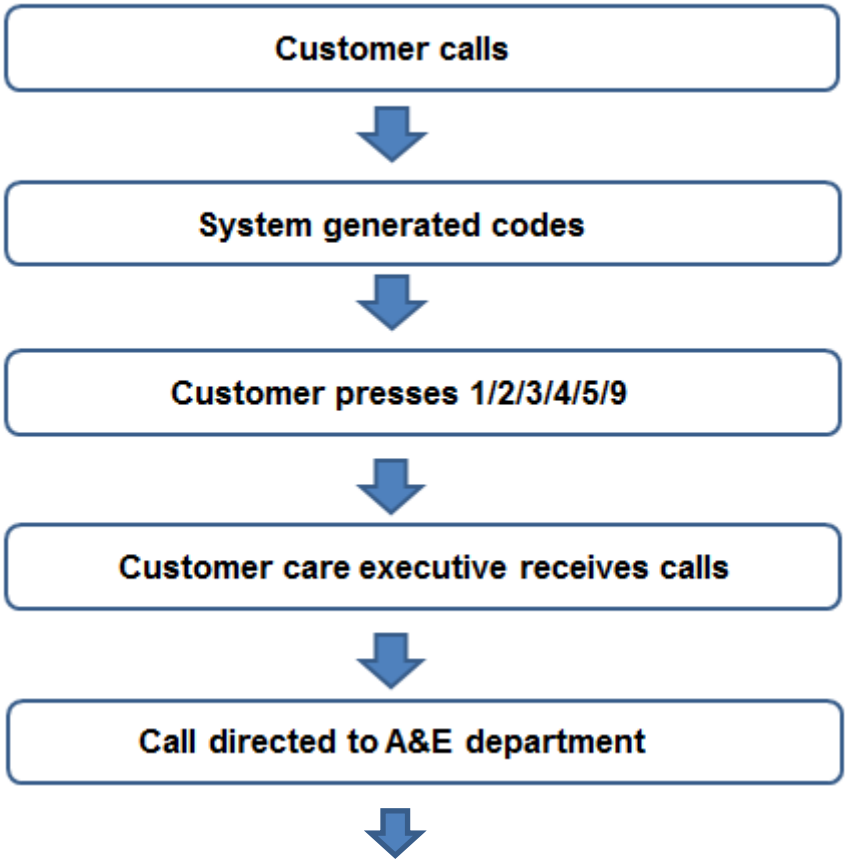
Ishikawa diagram helped to find the cause and effects relationship between a numbers of factors responsible for high number of irrelevant calls. Based on this a qualitative analysis was done to find out the feasibility of the solutions found for the respective responsible factor.

Table 8: Qualitative analysis on the reasons of irrelevant calls at A&E department

Sr. No.	Concerns/ Issues	Potential Quick Win Opportunity (Solutions)	Easy and Fast to implement	Cheap to implement	Within the teams control	Easy reversible
1	**System generated code 1**	A trained person to receive this call before it reaches A&E	-	Yes	Yes	Yes
2	**Call gets lost in the system cannot be tracked back**	A system to track the lost calls	-	No	No	No
3	**Call on waiting or not picked up by customer care executive**	Increase the number of board lines to catch as many calls as possible	Yes	Yes	No	Yes
4	**Call not received at the specific department**	Provide mobile phones to CCO at receptive departments	Yes	-	No	Yes
5	**Customer calls at some specific department but dissatisfied with the information received**	Proper training to CCO's regarding information to be imparted. Thorough awareness of the hospital process	Yes	Yes	Yes	Yes
6	**Call not received by A&E CCO**	A dedicated person to receive the calls.	Yes	Yes	No	Yes
7	**CCO at A&E unable to solve the query**	Increase awareness and provide regular training to the CCO's of A&E	Yes	Yes	Yes	Yes

8	**Sisters call at A&E department for queries not related to A&E**	Increase awareness and provide regular training to sisters in hospital	Yes	Yes	Yes	Yes

After identifying value added and non-value added steps, a process flow was created eliminating all the non-value added steps and hence aiming to improve process efficiency and decrease the process variation.



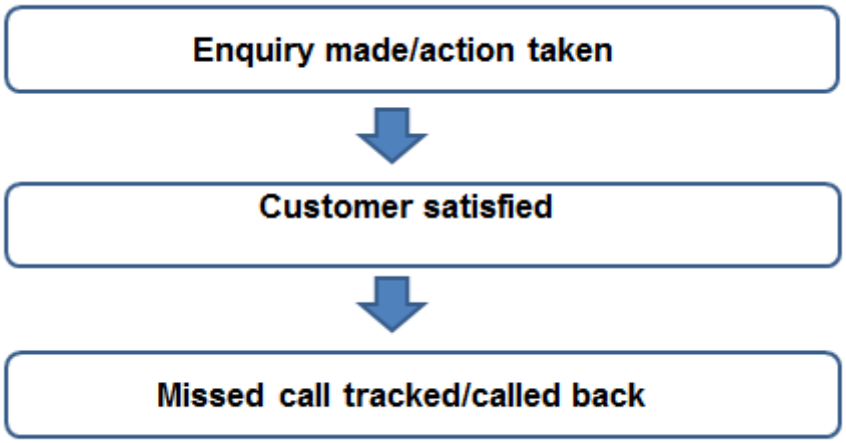


Figure 9: Figure showing process of calls processing at A&E department after waste removal

Establish Pull / Improve

This principle is about understanding the customer demand on the service and then creating the process to respond to this. Such that the organisation produces what the customer wants only when the customer wants it.

Once a team moves through the Define, Measure and analyse steps, they are now ready to use what they've learned about the process to be innovative when solving the problem at hand. Improve is the step where creative solutions to existing problems can be developed and tested, using various experiment or piloting techniques. The key deliverable in the Improve step is verifiable improvement through measurement. The best ideas for improvement, based on what was learned in Measure and analyse, are tested and implemented on a limited basis to determine if there is statistical evidence of sustained improvement. Once a team improves a process, the results should become quite clear on a control chart. When stakeholders can see the proof of improved performance, they will be more likely to accept and actually implement the team's recommendations. Improve is about taking the emotion out of decision making. Improve is about verification and validation of recommendations. Often times, teams make the mistake of thinking they "know" what will work. Thus, they blindly implement what they think is the best solution without proper testing. The result, more times than not, is that there is no measurable or sustainable improvement.

Our study revealed that the process of calls processing at A&E department of KDAH is not capable of meeting the customers' expectation of timely receiving the calls, leading to customer dissatisfaction. Also high number of irrelevant calls causes difficulty in functioning of nurses and staff at A&E again leading to customer dissatisfaction. Lean six-sigma provided us the context to discuss problems and processes keeping aside the emotions and encouraged open door communication with stakeholders. So the findings along with recommendations were presented and discussed with the management and stakeholders

involved in the process. This included meeting with the Deputy General Manager nursing, Call centre in-charge along with the A&E CCO's and nursing staff.

Area	Solution
1) Nursing	Routine training and awareness to the sisters about information gathering.
	Training to the sisters of A&E on information to be delivered.
	Every day on call list to be mailed to all nurse station with contact details across the hospital
2)Call centre/ CCO	Regular training to call centre personnel about the hospital processes and information to be imparted.
3)System	Increase the number of board line numbers so as to catch as many calls as possible.
	Prepare a system where it uploads on-call consultants name as soon as he punches his attendance in A&E department.
	A system to track the calls getting lost in the system.

Table 9: Table listing recommended solutions by the heads for reducing the number of irrelevant calls at A&E department

Seek Perfection / Control

Creating flow and pull starts with radically reorganising individual process steps, but the gains become truly significant as all the steps are linked together. As this happens as more and more layers of waste become visible and the process continues towards the theoretical end point of perfection, where every asset and every action adds value for the end customer. To achieve this management needs to implement and standardize the improvement plan in

order to gain improvement. Constant data tracking and documentation needs to be done to meet the customers' expectation and to keep the process within the specified limits.

The real strength of the DMAIC steps is the Control step. Too often, teams do a lot of hard work, actually improve the process and results, and then implementation of the improved process doesn't go smoothly. There is pressure to move on; time isn't spent on having a smooth transition and the buy-in for full implementation just isn't quite there. The result is that sustaining the improvement realized in the Improve step becomes difficult. The purpose of the Control step is to ensure a successful implementation of the team's recommendation so that long-term success will be attained. The new and improved process will be flowcharted and these new methods will become the new standard operation procedures. Results will continue to be tracked so that any "drift" back to previous results can be monitored and addressed in a proactive manner. The Control step is about the transfer of responsibilities and establishing plans for long-term process control.

Conclusion

Call processing is not only ubiquitous, but also a hot bed for customer dissatisfaction. The performance can make or break any service provider's indexes of customer loyalty. Only by honing in on what the client needs (or another department, if the call centre is internal), building a process around those needs and collecting measurement on key factors can a call centre be an asset to the organization as a whole. At that point, other data (why people are

calling, utilization of its associates, hold times, etc.) become a critical and trusted part of understanding the entire enterprise

Customer service representatives need to be able to answer the phone. They need to resolve questions quickly. Hold time needs to be minimal and at or under the customer's expectation. Yet these important metrics, taken alone, with little or no regard to other client-affecting service level indicators, can lead to a loss of business.

Lean six sigma Management can successfully be used in a hospital call processing system. Introducing Lean six-sigma Management can cause initial resistance from the management yet higher productivity and a reduction in irrelevant calls can be achieved. The project suggests that Lean thinking can become an important part of new service development as well as service deployment. An appropriate lean six-sigma approach as discussed in this study can improve efficiency as well as customer satisfaction.

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Annexure A – Data collection Sheet A&E Department

Calls		1	2	3	4	5	6	7	8	9	10
Type of call	Relevant/ Irrelevant										
Reason for Call	For ambulance										
	Calls from sisters in wards for bed availability in A&E										
	Calls from sisters in wards for phone numbers and enquiry about other wards										
	Patient calls Directly for Enquiry.why A&E?										
	Call centre forwarded enquiry.why A&E?										
	Consultant call from within hospital. Why A&E?										
	Outsiders call to discuss about disease and symptoms										
	Other unexplained reasons.plz mention if known.										