PART 1

1.1 INTRODUCTION OF ORGANIZATION:

Fortis Escorts Hospital Jaipur (FEHJ) is a renowned name in the field of cardiac surgery, interventional cardiology and cardiac diagnostics. The institute formally came into existence on 2nd August 2007; FEHJ was set up as a dedicated cardiac hospital to bring to India the best cardiac care, training of cardiac surgeons and cardiologists and also to conduct research of international standards. Fortis Escorts Hospital Jaipur is at a prime location of the city and encompasses major population of Rajasthan in the field of healthcare services. It is spread over an area of 6.68 acre. The facility is a Greenfield project of the Fortis group.

FEHJ has a capacity of **300 beds, 210 functional beds and 5 Operation Theatres, 1 Cath Lab** besides an array of other world-class facilities. FEHJ provides top end services in areas of acute care, invasive and non-invasive cardiology and state-of-the-art surgical procedures, besides playing a leading role in prevention, early detection and the reversal of heart disease.

FEHJ is **NABH accredited** facility. The hospital has a total of **48 Critical Care beds** to provide intensive care to patients after surgery or angioplasty, emergency admissions or other patients needing highly specialized management including tele-cardiology (ECG transmission through telephone). The hospital is backed by the most advanced laboratories performing complete range of investigative tests in the field of Radiology, Bio-chemistry, Hematology, Transfusion Medicine and Microbiology.

The FEHJ is unique in the field of multi specialty medical services. The hospital is centrally air-conditioned and environmentally sealed to ensure optimum comfort with ideal asepsis and hygiene. A safe power generation and a centralized UPS system ensuring life saving equipment function without interruption. The hospital has a vast computer network of over 225 nodes linked through Ethernet, utilizing the latest IT tools striving to support the best care and service to the patients. The IT provides three unique application software's namely MEDTRAK (Electronic patient record), PRODIGIOUS (Inventory management) and REPORTHOOK (Report generation).

Mission 2012 (1/2)

Fortis aspires to…

. . . Domestic leadership in Cardiac, Ortho, Neuro, Renal and Gastro

. . . globally recognized in Cardiac & Ortho

Pan India presence with 40 Hospitals ~ 6000 Beds

3,500 Doctors

15,000 Nurses

. . . Employees

. . . have an International presence

Mission 2012 (2/2)

With financial goals of…

Revenues of USD 1 Bn

Gross margins > 65%

Highest profitability in the Industry with EBIDTA @ 30% across its steady (4 year+) facilities

Return on Capital Employed @ 24%

VISION

To create a *Globally respected Healthcare* organization known for *Clinical Excellence* and *Distinctive Patient Care.*

The vision will be achieved by:

Establishing a network of joint ventures and satellite centers to extend the availability of quality health care in India and other developing countries.

Providing state-of-the-art world standard health care that exceeds expectations of patients and families.

Networking with other organizations to promote health and wellness in society through education, preventive checkups and community outreach programs.

Providing expert and regular training to the talented manpower for medical, para-medical, nursing and other professionals in the field of healthcare. By following Ethical Values and Efficient Systems.

Pursuing independent as well as collaborative research in all aspects of cardio-thoracic medicine and surgery to develop affordable solutions for heart problems of this region.

VIRTUOUS VALUES:

V – VISION: Imbibe and share the vision.

I – INTEGRITY: Lead through honesty and integrity

R – RESPECT: Earn respect

T – TRUST: Gain patient trust

U – UNDERSTANDING: Commit to compassion, care and understanding.

O – OWNERSHIP: Own quality excellence.

U – UPHOLDING: Uphold innovation and continuous improvement

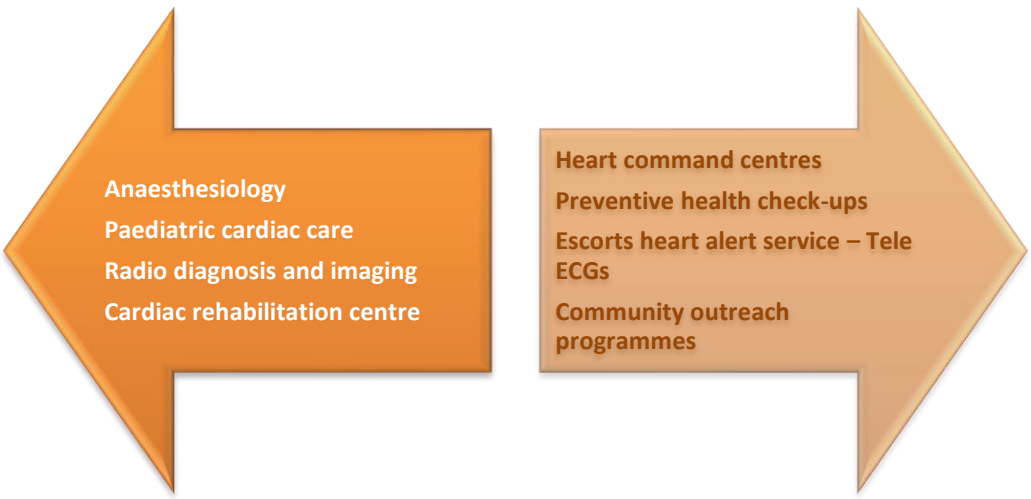
S – SHARING: Develop and share success.

FACILITIES AT FORTIS JAIPUR

They provide following round the clock services for our visitors and patients:

1) Round-the-clock Emergency Services
2) 24-hour Ambulance Service
3) ICU Specialized Post Operative and Emergency Care
4) Operation Theatre
5) Imaging and Diagnostics
6) One of the most Advanced Pathology Labs in the country
7) 24- hour Chemist Shop
8) Cafeteria
9) Attendant Rest Area
10) ATM
11) Preventive Health Checkups
12) Call centre

SERVICES AT FORTIS ESCORTS HOSPITAL (FEHJ):



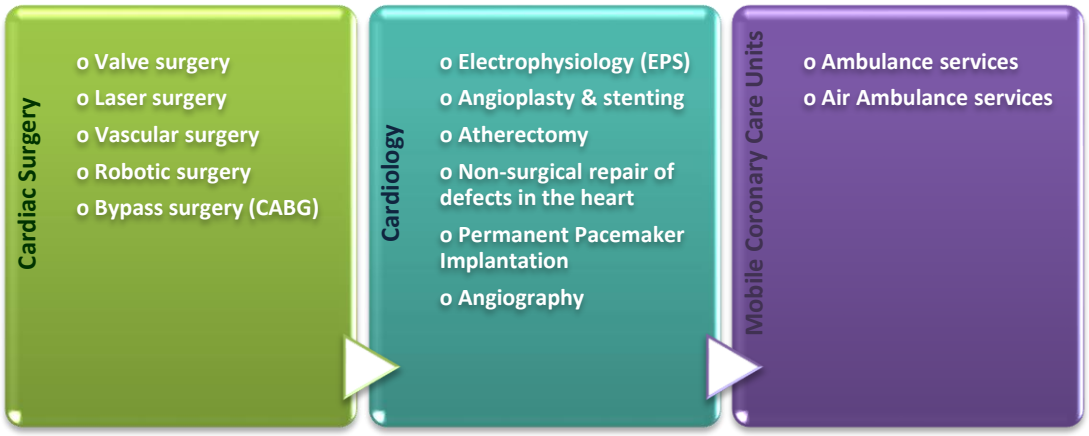


Table 1. FLOOR PLAN AT FEHJ

S. No.	*Facility*	*Location*
1.	Admission	Ground Floor
2.	Appointments	Ground Floor
3.	OPD I, OPD II, Paediatric OPD, Cardiac OPD	Ground Floor
4.	Executive check-up, Dental and Ophthalmology Department	Ground Floor
5.	Doctor's Longue	Ground Floor
6.	Emergency & Triage	Ground Floor
7.	TPA / Corporate Cell	Ground Floor
8.	Billing	Ground Floor
9.	Laboratory	Ground Floor
10.	Endoscopy	Ground Floor
11.	Radiology	Ground Floor
12.	EPABX	Ground Floor
13.	Blood Bank	Ground Floor
14.	Dialysis	Ground Floor
15.	MICU	Ground Floor
16.	HDU	Ground Floor
17.	General Ward	1st Floor
18.	Neuro General Ward	1st Floor
19.	Library	1st Floor

20.	**Training Hall**	**1st Floor**
21.	**Zonal Director's Office**	**1st Floor**
22.	**Medical Superintendant's Office**	**1st Floor**
23.	**LDR / NICU**	**1st Floor**
24.	**OT Complex**	**2nd Floor**
25.	**SICU I , SICU II**	**2nd Floor**
26.	**General Surgery, Internal Medicine, CTVS**	**3rd Floor**
27.	**Orthopaedic, Obs. & Gynae, Paediatric Ward**	**4th Floor**
28.	**Human Resource**	**Basement**
29.	**Quality Assurance**	**Basement**
30.	**Nursing Training & Infection Control Department**	**Basement**
31.	**Finance**	**Basement**
32.	**Marketing**	**Basement**
33.	**Biomedical Engineering**	**Basement**
34.	**Engineering Services**	**Basement**
35.	**Housekeeping**	**Basement**
36.	**Purchase / Stores / Pharmacy**	**Basement**
37.	**Food & Beverages**	**Basement**
38.	**MRD**	**Basement**
39.	**Security**	**Basement**
40.	**Laundry**	**Basement**

MEDICAL PROGRAMMES AT FEHJ :

1. CME (Continuous Medical Education)
2. CNE (Conituous Nursing Education)
3. Case Presentations
4. SPANDAN
5. Antenatal Progarmme
6. Golden Age Club
7. Fortis Escorts Gramin Swasthya Yojna

1.2 DEPARTMENT OF MEDICAL SERVICES:

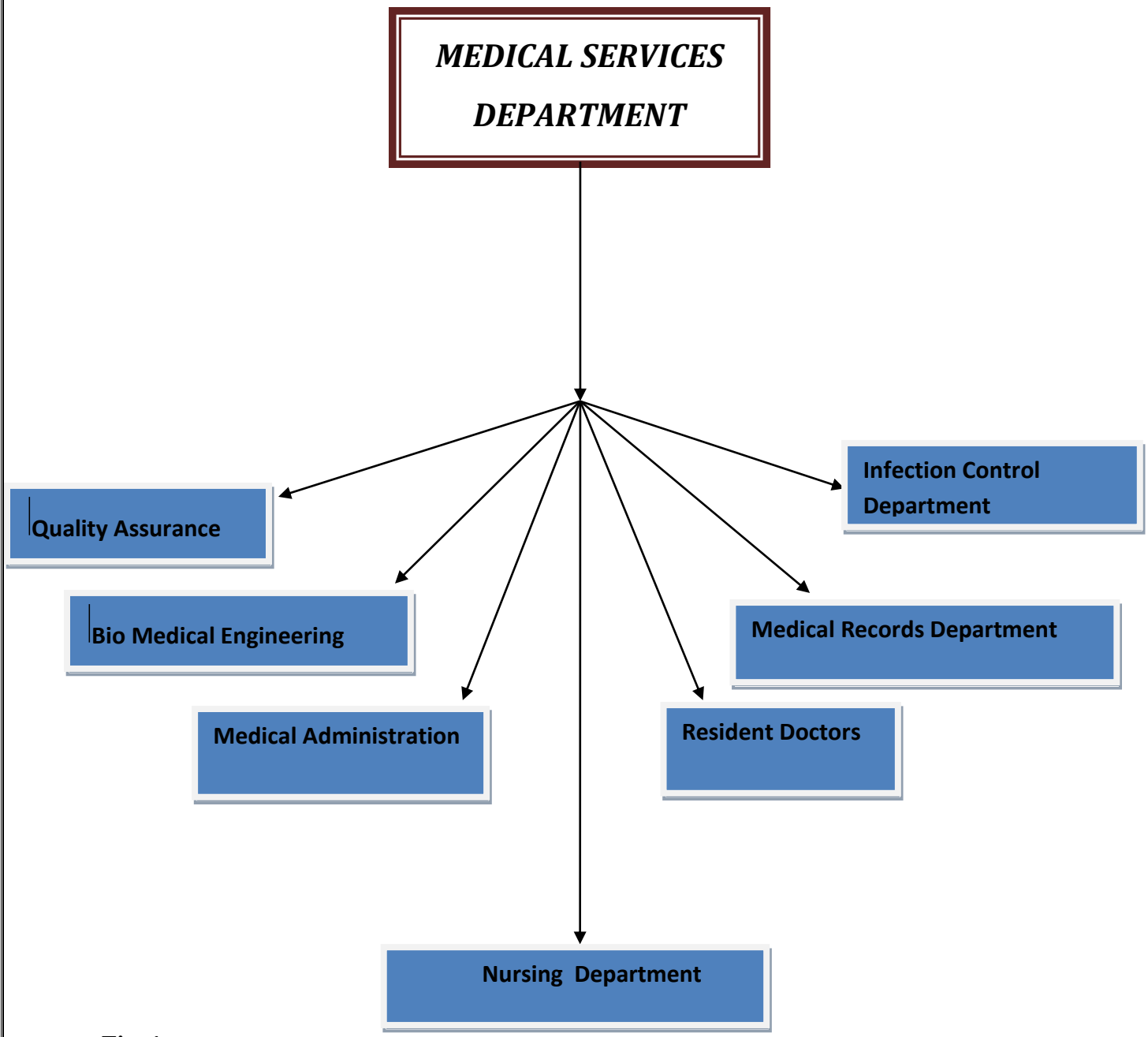


Fig. 1

On routine basis the Medical Services Department incorporates the departments like Quality Assurance Department, Bio Medical Department, Medical Administration, Resident Doctors, Medical Records Department, Infection Control Department and the Nursing Department.

During the dissertation period the departments that were mainly visited were: The Medical Administration, Infection Control Department, Quality Assurance Department, Resident Doctors, Medical Records Department, and the Nursing Department.

The programmes with which I was associated centrally were Continuous Medical Education, Case Presentations, SPARKLE and SPANDAN.

1.3 MANAGERIAL TASKS PERFOMED:

During the tenure of three months I got numerous opportunities to perform a variety of tasks. The major ones were:

1. Medical Audit of Surgical Safety Checklist.
2. Participated in various meetings of the management regarding various management issues.
3. Medical Audits related to Death Trigger Tools, Prescription Audit.
4. Participated in preparation of the NABH reaccreditation.
5. Organized Continuous Medical Education (CME).
6. Performed the mapping of the items list of Fortis corporate with that of Fortis Jaipur.
7. Participated in the cultural activities like poster and slogan competitions, World Consumer's Day, SPARKLE etc.
8. Participated in various mock drills like Code pink, Fire Drill, and Code Blue.
9. Prepared format of forms like Self Declaration Form.
10. Performed the study on Catheter Associated Urinary tract Infection in the infection control department of Fortis Escorts Hospital Jaipur.
11. Interaction with a variety of stakeholders for the audit of their operations and making reports for the same. Noting all the gaps and working on the corrective actions.
12. Daily NABH Audits of various clinical and non- clinical departments like Triage, Dialysis, MICU, HDU, SICU 1, SICU 2, Radiology, HR, House Keeping, Laundry, Security, Nursing, etc. .

1.4 REFLECTIVE LEARNING:

The entire tenure of three months was a big learning. It comprised of a variety of managerial tasks allotted to me.Since, I did my dissertation in the Medical Services Department that incorporates the majority of the functional departments of the hospital. It provided hands on experience of almost all the hospital operations.

The NABH Inspection at the Fortis Escorts Hospital Jaipur, was one of the best opportunities to learn how a hospital prepares itself for NABH inspection. Since, I was involved in the core preparation of this event it was an added advantage during the dissertation period. Clinical Audits, Continuous Quality Improvement, Clinical Guidelines, Training the staff of different departments and Identification of gaps and implementing interventions.

PART II

Dissertation on

Study on the Incidence of CAUTI and Efficacy of Hand Hygiene Practices to reduce Catheter Associated Urinary Tract Infection at Fortis Escorts Hospital Jaipur

2.1 INTRODUCTION

Hospital acquired infection is also called Nosocomial infection. It is the single largest factor that adversely affects both the patient and the hospital. The English word Nosocomial is derived from the Greek word "Nosokomeion" meaning "hospital".

Hospital Acquired Infections is the 1st Global Patient Safety Challenge launched by WHO under the banner " Clean Care is Safer Care" in October 2005.Prevention of HAI is at the heart of patient safety.

Historically, infection control practices, in one form or another, have existed since great surgeons, like Lister, recognized the significance of bacteria in producing postoperative wound infections. John Bell, in 1801, remarked that hospital infection exists in every type of hospital[3]. Nosocomial infections, many of which are transmitted from patient to patient by poorly sanitized hands of health care workers, exert a significant toll in human and economic terms every year. Even though good hand hygiene is acknowledged as a simple but powerful technique for preventing nosocomial infections, these infections remain a major problem.

Definition of Hospital Acquired Infection (HAI) :

WHO has defined HAI as

- "An infection acquired in hospital by a patient who was admitted for a reason other than that infection or an infection occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission.

- This also includes infections acquired in the hospital but appearing after discharge, occupational infections among staff of the facility, infections occurring 48 hours after admission in a healthcare establishment".

Definition of Urinary Tract Infection (UTI) :

- Urinary tract infections (UTI) are defined using symptomatic urinary tract infection (SUTI) criteria or Asymptomatic Bacteremic UTI (ABUTI) criteria. UTI's that are catheter-associated (i.e. patient had an indwelling urinary catheter at the time of or within 48 hours before onset of the event).
- **Symptoms :**
- The presence of fever >38ºC
- Suprapubic tenderness
- Costovertebral angle tenderness
- Or otherwise unexplained systemic symptoms such as altered mental status, hypotension, or evidence of a systemic inlammatory response syndrome, together with one of the following laboratory profiles.

Infections monitored

There are basically four infections being tracked by the hospital for HAI which CDC (1996) has suggested:

- **CAUTIs** (Catheter Associated Urinary Tract Infections)
- **SSIs** (Surgical Site Infections)
- **VAP** (Ventilator Associated Pneumonia)
- **CRBSIs** (Central line Related Blood Stream Infections)

Definition of Hand Hygiene:

Hand hygiene has always been considered one of the cornerstones of infection control but adherence to recommendations for hand-hygiene practices remains extremely low in most

health-care settings. Compliance with hand-washing in hospital environments is generally less than 50%. Large number of barriers to appropriate hand hygiene have been reported. Careful epidemiological investigations have clearly identified some of the key parameters involved and have proposed corrective measures. Unsurprisingly, the leading factor for non-compliance is time constraint. Other reasons reported by Health Care Workers for the lack of adherence with hand hygiene recommendations include: skin irritation by hand hygiene agents, inaccessibility of hand hygiene supplies, interference with Health Care Workers-patient relationship, patient needs perceived as a priority, wearing of gloves, forgetfulness, the lack of knowledge of guidelines, insufficient time for hand hygiene, high workload and understaffing, and the lack of scientific information showing a definitive impact of improved hand hygiene on hospital-acquired infection rates.[4]

Types of hand washing:-

1. Surgical hand washing: It aims at removing or killing transient flora. It also decreases the resident organisms to prevent the risk of wound contamination, should the gloves become damaged during the procedure.

Indication: Before all surgical invasive procedures.

Key points in surgical hand washing:

- Jewellery (watches, bangles, rings) should be removed before washing hands. Nails polishes should also be removed before scrubbing for surgery & nails should be kept short & clean.
- As a preliminary step to surgical hand wash, hands should be washed with soap & water.
- Remove debris from underneath finger nails using a nail cleaner under running water.
- Surgical hand wash/scrub can be performed using either an antimicrobial soap solution (2% chlorhexidine or an alcohol based hand rub with persistent activity (0.5% chlorhexidine with alcohol).
- When performing hand scrub using antimicrobial soap solution, scrub hands & forearms till just above the elbow for a period of 2-6 minutes. Dry hands & arms using sterile towel. Then don the gloves.

- When using an alcohol based surgical hand scrub solution follow manufacturer's recommendations. Before applying this solution wash the hands & forearms with soap & water & dry them completely. After application of the solution for 2-3 minutes allow hands & forearms to dry before donning gloves.

2) Hygienic Hand Washing : It is a procedure whereby hands are thoroughly washed with soap & water or an alcohol preparation for a period of 20-30 seconds. This is effective in removing or killing transient micro-organism.

Indications:

- Before performing invasive procedure.
- Before caring for susceptible patients.
- Before & after touching wounds & urethral catheters.
- Before & after wearing gloves.
- After contact with blood, secretions or situations in which microbial contamination is likely.
- Before & after preparing injectable medications.

Method:

It is generally the same as described for the surgical hand wash except that the period of contact with soap & water is cut down to 20-30 seconds.

3) Social Hand Washing : It removes most transient micro-organisms from moderately soiled hands.

Indications:

- Before handling food, eating & feeding the patients.
- After visiting the toilet.
- Before & after nursing the patients.
- Whenever the hands are visibly soiled.

Method:

During this procedure vigorous mechanical friction is applied to all surfaces of the hands for a period of at least 10 seconds using a defined technique. The hands are then ideally rinsed under a stream of running water. Hands should always be dried on a single use towel of approximate size of 12"×12". Multiple uses of towels should always be avoided.

Agents used for Hand Hygiene:

a. Plain water & soap

b. Antiseptic detergents:

- 4% chlorhexidine gluconate detergent solution
- Povidone iodine detergent solution with 0.75% available iodine.

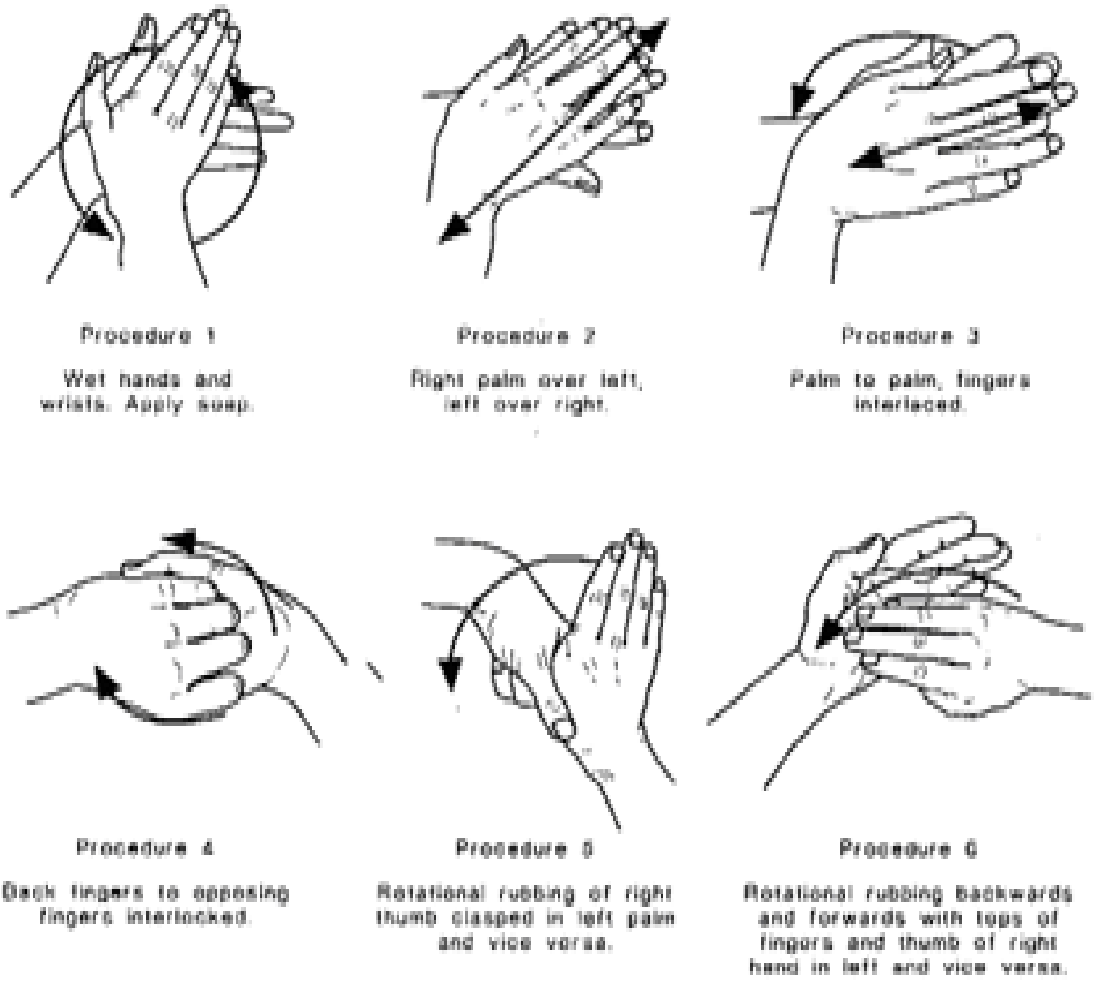
c. Alcoholic hand washes:

- 0.5% chlorhexidine or povidone iodine in 70% isopropanol or ethanol
- 60% isopropanol or 70% ethanol with emollient

Steps Of Hand Washing

1) Palm to Palm
2) Palm over dorsum
3) Fingers interlaced
4) Nuckles of both hands
5) Rotational movement of thumb of both hands
6) Tip of fingers of both hands
7) Rotational movement of both wrists
8) Wash from tip of fingers till wrist

Steps of hand washing



NOTE: Repeat procedures 1-6 until the hands are clean. Rinse hands and pat dry.

Fig. 2

2.1.1 MANAGERIAL / SECTORAL PROBLEM:

- The burden of disease attributable to healthcare associated infection is huge, with hundreds of millions of patients affected worldwide every year. These infections contribute to patient deaths, disability and promote resistance to antibiotics. The economic costs are considerable. Increased LOS, lost workdays, increased drug use, need for isolation, additional investigations etc.

- Urinary tract infections (UTI) associated with urinary catheters are the leading cause of secondary nosocomial bacteremia. Acounting to more than 30 percent of hospital acquired bacteremias arise from the urinary tract, and the mortality associated with this condition is about 10 percent. Issues related to symptomatic and asymptomatic bacteriuria (both of which are subsets of UTI and are sometimes referred to as symptomatic or asymptomatic UTI) in patients with indwelling bladder catheters will be reviewed here. Issues related to asymptomatic bacteriuria and cystitis in other circumstances, and the indications for placement, methods of catheterization, and management and complications of bladder catheters are discussed separately.

2.1.2 BACKGROUND OF THE PROBLEM:

Magnitude of HAI (*Source: WHO Global Patient Safety Challenge, (2005*)

- At any time, over 1.4 million people worldwide are suffering from infections acquired in hospital. Between 5% and 10% of patients admitted to modern hospitals in the developed world acquire one or more infections. The risk of health care associated infection in developing countries is 2 to 20 times higher than in developed countries. In the US, 1 out of every 136 hospital patients becomes seriously ill as a result of acquiring an infection in hospital. This is equivalent to 2 million cases and about 80,000 deaths a year i.e. 200 people every single day. In developing countries the situation is even more stark with 4,384 children dying every day of health care associated infection. In intensive care, HAI affects about 30% of patients and the attributable mortality may reach 44%. SSI accounts for about 14% of possible adverse events threatening patient safety in hospitals in developed countries. Noscomial infections result from the interaction of several factors:

(1) Microorganisms in the hospital environment.,

(2) The compromised (or weakened) status of the host, and

(3) The chain of transmission in the hospital.

- **Micro- organisms in the Hospital :**

- Although every effort is made to disinfect and check the growth of microorganisms in the hospital, the hospital environment is a major reservoir for a variety of pathogens. One reason is that the normal flora from the human body are opportunists and present a particularly strong danger to hospital patients. In fact, most of the bacteria live in healthy people, but are pathogenic only for individuals whose defenses have been weakened by illness or therapy. In the past, most nosocomial infections were caused by gram-positive microbes. At one time, gram positive Staphylococcus aureus was the primary cause of nosocomial infections. Although antibiotic-resistant strains of that organism are still significant factors, the major causes today are gram-negative bacteria, such as E. coli and Pseudomonas aeruginosa has the ability to cause opportunistic skin infections, especially in surgical and burn patients. In addition to the threat of opportunists in the hospital, some micro-organisms become resistant to antimicrobial drugs. For example, P aeruginosa and other gram-negative bacteria tend to be difficult to control with antibiotics because of their R factors, which carry genes that determine resistance to antibiotics. As the R factors recombine, new and multiple resistance factors are produced. These strains become part of the flora of patients and hospital personnel and become progressively more resistant to antibiotic therapy. In this way, people become part of the reservoir (and chain of transmission) for antibiotic-resistant strains of bacteria. Usually, if the host's resistance is high, the new strains are not much of a problem. But if disease, surgery, or trauma has weakened the host's defenses, secondary infections may be difficult to treat.

As depicted in the **Table 2** below:

COMMON ORGANISMS ASSOCIATED WITH HEALTHCARE ASSOCIATED INFECTIONS		
S. No.	**ORGANISMS**	**TYPE/SITE OF INFECTIONS**
1.	P. Aeruginosa	Opportunistic Infection
2.	E. Coli	Surgical Site Infections (SSI)
3.	S. Aureus	Surgical Site Infections (SSI)
4.	S. Epidermidis	Prosthetic implant surgery, vascular catheterization, premature infants
5.	S. pyogenes	Skin graft infection (full skin thickness burns)
6.	Bacteroides	Peritonitis and wound infections

COMPROMISED HOST

A compromised host is one whose resistance to infection is impaired by disease, therapy, or burns. Three principal conditions can compromise the host: (I) broken skin or mucous membranes, (2) a suppressed immune system, and (3) impaired cell activity. As long as the skin and mucous membranes remain intact, they provide formidable physical barriers against most pathogens. Burns, surgical wounds, trauma (such as accidental wounds), injections, invasive diagnostic procedures, intravenous therapy, and urinary catheters (used to drain urine) can all break the first line of defense and make an individual more susceptible to disease in hospitals. Burn patients are especially susceptible to nosocomial infections because their skin is no longer an effective barrier to micro-organisms. A burn patient can have tissue damage caused by heat, electricity, radiation, or chemicals, all of which destroy proteins and cells in affected tissues. The risk of infection is also related to invasive procedures, such as administering anesthesia. This may alter respiration and contribute to pneumonia, and tracheotomy, in which an incision is made into the trachea to assist breathing. In healthy individuals, white blood cells called T lymphocytes provide resistance to disease by killing pathogenes directly, mobilizing phagocytes, and secreting chemicals that kill pathogens. Drugs, radiation therapy, steroid therapy, burns,

diabetes, leukemia, kidney disease, and malnutrition can all adversely affect the actions of T lymphocytes and compromise the host. A final factor that may compromise host defenses is impairment of the development or activities of white blood cells called B lymphocytes, which develop into antibody-producing cells. Antibodies provide immunity by such actions as neutralizing toxins, helping to lyse pathogens. Conditions that alter the actions of B lymphocytes include malnutrition and cirrhosis of the liver. The principal kinds of nosocomial infections.

Table: 3

S. No.	Infection	Comment
1.	Urinary tract	Most common, usually accounting for about **50% of all nosocomial infections.** Typically related to urinary catheterization.
2.	Surgical wound	Ranks second in incidence **(about 25%).** It is estimated that from 5% to 12% of all surgical patients develop postoperative infections; the percentage can reach 30% for certain surgeries, such as colon surgery and amputations.
3.	Lower respiratory infection	Nosocomial pneumonias rank third in incidence (about 12.11%) and have high mortality rates. Most of these pneumonias are related to respiratory devices that aid breathing or administer medications.
4.	Bacteremia	Bacteremias account for about 6% of hospital infections. Intravenous catheterization is implicated in nosocomial infections of the blood stream, particularly infections caused by bacteria and fungi.
5.	Cutaneous infection	Among the least common of all nosocomial infections. However, newborns have a high rate of susceptibility to skin and eye infections.

CHAIN OF TRANSMISSION

Given the variety of pathogens (and potential pathogens) in the hospital and the compromised state of the host, routes of transmission are a constant concern. The principal routes of transmission of nosocomial infections are direct contact transmission from hospital staff to patient and from patient to patient, and Indirect contact transmission through the hospital's ventilation system (airborne transmission). Because hospital personnel are often in direct contact

with patients, they can often transmit disease. For example, a physician or nurse may transmit her or his flora to a patient when changing a dressing or a kitchen worker who carries Salmonella can infect a food supply. Certain areas of a hospital are reserved for specialized care.These include the burn, hemodialysis, recovery, intensive care, and oncology units.Unfortunately, these same units also group patients together and provide environments for the epidemic spread of nosocomial infections from patient to patient. Many diagnostic and therapeutic hospital procedures provide a fomite route of transmission. The urinary catheter used to drain urine from the bladder is a fomite in many nosocomial infections.Intravenous catheters, which pass into a vein through the skin to provide fluids, nutrients, or medication, can also transmit nosocomial infections. Respiratory aids can introduce contaminated fluids into the lungs. Needles may introduce pathogens into muscle or blood, and surgical dressings can become infected and promote disease.

2.1.3 GENESIS OF THE PROBLEM:

The sources for HAIs may be endogenous and exogenous infectious agents (Horan et al, 2008).

1. Endogenous sources are sites which are normally inhabited by the microorganisms such as the skin, nose, mouth, gastrointestinal (GI) tract, or vagina.
2. Exogenous sources are external sources such as patient care personnel, visitors, patient care equipment, medical devices, or the health care environment.
3. Flora from the health care environment (endemic or epidemic exogenous environmental infections) (Kowalski, 2007). Several types of microorganisms survive well in the hospital environment such as in water, damp areas, and occasionally in sterile products or disinfectants. It is also found in items such as linen, equipment and supplies used in care (appropriate housekeeping normally limits the risk of bacteria surviving as most microorganisms require humid or hot conditions and nutrients to survive). It can be present in food and in fine dust and droplet nuclei generated by coughing or speaking (bacteria smaller than 10 μm in diameter remain in the air for several hours and can be inhaled in the same way as fine dust).

2.1.4 CONSEQUENTS:

Possible reasons for HAI incidences in the hospital

When noticed by the author during the project term in the hospital, following factors come across to be responsible for the spread of infection in the hospital:

- There are various departments in which patient flow is high and leaves less time for staff to perform proper hygiene procedures between inter patient duration (Duration between discharge of a patient and admission of another patient in the same ward and bed). Apart from this, there are some departments where probability for spread of infection is high such as ICU, where patients are immuno compromised, who are prone for the infection.
- High Patient load which prioritise the treatment procedures over consideration of infection control management.
- Low maintenance of hand hygiene compliance affects the prevalence of HAI.
- Attrition of nurses into more lucrative job offers leads to inadequate Nurse: Patient ratio, a hindrance in making the hospital infection free. The ratio should be ideal to provide proper care to each patient (such as it should be 1:1 in ICU's according to CDC).
- Continuous recruitment of new nursing staff due to high demand which involves inadequately experienced staff.
- Frequent changes in the staff also require repetitive training modulating the pattern of the tasks.
- Improper isolation of the infected patients and keeping patients with different infections together will increase the chances of cross infection.
- The importance of getting high risk profile of the patient done at the time of admission has to be considered.
- Employee ignorance towards the protocols decided by the hospital for control of infection.

2.1.5 CURRENT PRACTICES AT FORTIS ESCORTS HOSPITAL JAIPUR:

The infection control department at FEHJ is responsible for preparing the yearly work plan for review by the infection control committee and administration. The infection control team at the hospital provides a scientific and technical support role: e.g. surveillance and research, developing and assessing policies and practical supervision, evaluation of material and products, control of sterilization and disinfection, implementation of training programmes. The team also supports and participates in research and assessment programmes at the national and international levels (Mercier, 1997).

Infection Control Committee

An Infection Control Committee provides a forum for multidisciplinary input and cooperation, and information sharing. This committee includes Medical Superintendent, Medical Coordinator, Deputy Chairperson, Secretary, Representative of Dept of Microbiology, Representative of Medical Faculty, Representative of Surgical Faculty, Representative of Child Health Faculty, Nursing Superintendent, OT supervisor, CSSD Supervisor, Hospital Infection Control Nurse and Representative from Pharmacy.

The committee has a reporting relationship directly to either administration or the medical staff to promote programme visibility and effectiveness.

Fortis Escorts Hospital Jaipur, has an infection control team backed by an infection control committee. The team consists of an infection control officer and two infection control nurses. The goal of the department is to assist in providing a high level of patient care by reducing the ever present risk of nosocomial infection of the patients and staff through Surveillance, Education, Control and continuous review and evaluation of infection control practices (Hospital infection control manual, 2009).

The role of this department is as follows:

- To set general infection control policy/ guidelines and to provide input in specific infection control practices.
- To access and promote improved practice at all levels of the health facility.
- To develop infection control procedures for all departments.

- To serve as an information resource for all departments on various disinfection and cleaning products and procedures.
- To educate staff on biomedical waste segregation and management.
- To review epidemiological surveillance data and identify areas of intervention.
- To review and provide input into investigation and epidemics.
- To ensure appropriate staff training in infection control and prevention.
- To plan, monitor, evaluate, update, and educate about patient and employee safely.
- To monitor the decision of infection control committee.

The methods used to assess patient needs in order to customize services provided are as follows:

- Daily surveillance rounds to monitor biomedical waste disposal.
- Daily surveillance rounds for data collection/ tracking urinary tract infections, surgical site infections, ventilator associated pneumonia and blood stream infections.
- Regular surveillance for the monthly assessment of hand hygiene compliance.
- Regular monitoring of sterilisation cycles in CSSD.
- Regular monitoring of environmental samples from OTs/ ICUs.\monthly tracking of needle stick injuries in health care workers.
- Development and distribution of appropriate informational materials- Hand hygiene steps, waste disposal charts, fumigation protocols etc.
- Monthly monitoring of surface micro organism from stethoscopes, lap[top keyboards and cellular phones of health care workers.

1. It conducts regular infection control audits and carries out surveillance across various areas in the hospital.
2. It keeps surveillance on water sources, finger dubs, floor areas, prevalent flora in the hospital and do air checks.
3. It has regular outbreak analysis of infection based on infection control audits.
4. It embodies two infection control nurses who are responsible for maintaining adequate hygienic conditions in the hospital.

In an emergency (such as an outbreak), this committee must be able to meet promptly. It has the following tasks:

- review and approve a yearly programme of activity for surveillance and prevention

- review epidemiological surveillance data and identify areas for intervention
- assess and promote improved practice at all levels of the health facility
- ensure appropriate staff training in infection control and safety
- review risks associated with new technologies, and monitor infectious risks of new devices and products, prior to their approval for use
- review and provide input into investigation of epidemics
- communicate and cooperate with other committees of the hospital with common interests such as Pharmacy and Therapeutics or Antimicrobial Use Committee, Biosafety or Health and Safety Committees, and Blood Transfusion Committee.

Infections monitored at Fortis Escorts Hospital Jaipur

There are basically four infections being tracked by the hospital for HAI which CDC (1996) has suggested:

- **CAUTIs** (Catheter Associated Urinary Tract Infections)
- **SSIs** (Surgical Site Infections)
- **VAP** (Ventilator Associated Pneumonia)
- **CRBSIs** (Central line Related Blood Stream Infections)

2.1.6 REVIEW OF LITERATURE:

1) A study was done by Kampf G, Löffler H, Gastmeier P, Bode Chemie GmbH, Hamburg on **" Hand hygiene for the prevention of nosocomial infections ".** Wherein, Hygienic hand disinfection has better antimicrobial efficacy than hand-washing and is the procedure of choice to be performed before and after manual contact with patients. The hands should be washed, rather than disinfected, only when they are visibly soiled. Skin irritation is quite common among healthcare workers and is mainly caused by water, soap, and prolonged wearing of gloves. Compliance can be improved by training, by placing hand-rub dispensers at the sites where they are needed, and by physicians setting a good example for others. This study concluded with improved compliance in hand hygiene, with proper use of alcohol-based hand rubs, can reduce the nosocomial infection rate by as much as 40%.
2) A study was performed by Ferguson JK on the topic **"Preventing healthcare-associated infection: risks, healthcare systems and behavior".** In the department of Medicine, of the John Hunter Hospital, Newcastle, New South Wales, Australia. The study incorporated the lapses in practice which create significant risk for patients and staff from HAI. Physicians must ensure that their interactions with patients are safe from the infection prevention standpoint. The critical preventative practice is hand hygiene in accord with the World Health Organization 5 moments model. Improving the use of antimicrobials, asepsis and immunization also has great importance. Hospitals should measure and feed back HAI rates to clinical teams. Physicians as leaders, role models and educators play an important part in promoting adherence to safe practices by other staff and students. They are also potentially effective system engineers who can embed safer practices in all elements of patient care and promote essential structural and organizational change. Patients and the public in general are becoming increasingly aware of the risk of infection when entering a hospital and expect their carers to adhere to safe practice. Poor infection control practice will be regarded in a negative light by patients and their families, regardless of any other manifest skills of the practitioner.
3) A study carried out by Backman C, Zoutman DE, Marck PB (Faculty of Nursing,) on the topic **" An integrative review of the current evidence on the relationship between**

hand hygiene interventions and the incidence of health care-associated infections" at the University of Alberta, Edmonton, Alberta and Canadian Patient Safety Institute, Ottawa, Ontario, Canada. Wherein, the team critically examine the overall state of the current evidence on the relationship between hand hygiene interventions and the incidence of health care-associated infections (HCAIs) in acute care and long-term care settings, and offer recommendations for future directions in the field based on our findings. Our comprehensive search strategy included all English articles for which hand hygiene or hand washing-related terms were combined with HCAIs. All studies that investigated a relationship between hand hygiene practices and HCAIs in acute care facilities were considered. These hand hygiene practices included the initiation of multimodal hand hygiene initiatives, the introduction of alcohol sanitizers, the implementation or changes of the infection control practices or infection control policies, and other organizational interventions. Studies only examining hand hygiene compliance, efficacy of alcohol hand gels, plain soap, and antimicrobial soap in reducing bacteria count recovered from hands were excluded.

4) A study was conducted by Pittet D in the Department of Internal Medicine, University of Geneva Hospitals, Switzerland on the topic **"Improving compliance with hand hygiene in hospitals"**. The study simply says - easy access to hand hygiene in a timely fashion and the availability of skin-care lotion both appear to be necessary prerequisites for appropriate hand-hygiene behavior. In particular, in high-demand situations, hand rub with an alcohol-based solution appears to be the only alternative that allows a decent compliance. The hand-hygiene compliance level does not rely on individual factors alone, and the same can be said for its promotion. Because of the complexity of the process of change, it is not surprising that solo interventions often fail, and multimodal, multidisciplinary strategies are necessary. A framework that includes parameters to be considered for hand-hygiene promotion is proposed, based on epidemiologically driven evidence and review of the current knowledge.**[4]**

5) A study conducted by Stamm US on the **"Guidelines for prevention of catheter-associated urinary tract infections".** The most common site of nosocomial infection, involving more than 400 000 patients in this country annually, is the catheterized urinary tract. These infections cause significant morbidity, prolong hospital stay, increase

hospitalization costs, and contribute to mortality caused by Gram-negative septicemia. Strict adherence to appropriate infection control procedures is necessary if the incidence and sequels of catheter-related infections are to be reduced. Based upon current understanding of the epidemiology of nosocomial urinary tract infections, guidelines for the prevention of catheter-associated urinary tract infections are presented.

6) A study carried out by Willson M, Wilde M, Webb ML, Thompson D, Parker D, Harwood J, Callan L, Gray M of the Columbia Hospital, Milwaukee, Wisconsin, USA. On the topic **"Nursing interventions to reduce the risk of catheter-associated urinary tract infection: part 2: staff education, monitoring, and care techniques".** The study is the second of a 2-part Evidence-Based Report Card reviewing current evidence pertaining to nursing actions for prevention of CAUTI in patients with short- and long-term indwelling catheters. Part 2 reviews multiple interventions for CAUTI prevention including staff education, monitoring of catheter use and CAUTI incidence, insertion technique, urethral meatal care, securement, use of a closed drainage system, bladder irrigation, frequency of catheter change, and antiseptic solutions in the drainage bag. Nursing actions for prevention of CAUTI were identified based on search of electronic databases and Web-based search engines for national or international clinical practice guidelines focusing on this topic. The following interventions reduced the incidence of CAUTI in patients managed by short-term indwelling catheterization: 1) staff education about catheter management, combined with regular monitoring of CAUTI incidence, (2) a facility-wide program to ensure catheterization only when indicated and prompt removal of indwelling catheters, (3) daily cleansing of the urethral meatus using soap and water or perineal cleanser, and (4) maintenance of a closed urinary drainage system. Mixed evidence suggests that use of a pre connected system reduces inadvertent interruption of a closed urinary drainage system and may prevent CAUTI. Limited evidence suggests that routine catheter changes every 4 to 6 weeks reduce CAUTI incidence in patients managed by long-term catheterization.

2.1.7 RATIONALE OF THE STUDY:

Since, the Urinary Tract Infections are among the most common, usually accounting for about **30% of all nosocomial infections.** Typically related to urinary catheterization. The purpose of this research is to answer these questions and cover the breach in the management the organisation to avert the situation of Nosocomial infection especially related to Catheter Associated Urinary Tract Infection (CAUTI).

Research is based onto the basic strategies being made and followed by any hospital against the nosocomial infection and follow up of the strategies. It also includes discussing the roles played by the infection control team elaboralety in preventing and managing the infection.

Conclusions shall be made onto the findings from the records of the hospital where the primary research will be conducted, leading to the recommendation to the executive board of the hospital in order to provide high quality care to the patients and eradicate the situation in which the hospital had to lose the faith of their patients and also restricts them in achieving the targets set in relation to infection control and patient treatment success, making them a well performing organisation.

The benchmarking of the surveillance system is monitored and suggested by the Infection Control Committee Members of Fortis Escorts Hospital Jaipur.

2.2 OBJECTIVE OF THE STUDY:

General Objective:

To ensure high patient safety by employing better interventions carried out by evaluating the incidences of Catheter Associated Urinary tract infection and further assessing the need of improvement.

In this regard implement the best practices and obtain the impact of awareness initiatives undertaken in the form of Hand Hygiene Practices by the Project "Study on the Incidence of CAUTI and efficacy of Hand Hygiene Practices to reduce Catheter Associated Urinary Tract Infection at Fortis Escorts Hospital, Jaipur targeted on all inpatients of Neuro General Ward and SICU 1.

Specific Objectives

1. To reduce the incidence of CAUTI in patients admitted under Neuro General Ward and Surgical ICU, at Fortis Escorts Hospital Jaipur .

2.To implement a set of interventions, and evaluate the impact of interventions in bringing about reduction in CAUTI in the concerned patients.

2.3 METHODOLOGY

2.3.1 The study design :

The study is quantitative as well as qualitative in nature.

Phase I – Is an evaluation of the key process of Medical Audit. It maps the pattern of the incidences of Catheter Associated Urinary Tract Infections that are reported in the Neuro General Ward and the Surgical Intensive Care Unit 1 of the Fortis Escorts Hospital Jaipur**.**

Phase II – Includes Comparison of the data regarding the incidences obtained from the wards foresaid.

Phase III – Includes evaluation and comparison of the Hand Hygiene Compliance Rate for the last two years 2009-2010.

Phase IV – Includes the implementation of interventions like Hand Hygiene Procedures in the specified wards for reducing the Catheter Associated Urinary Tract Infections.

2.3.2 Sampling

Sample – Includes all inpatients admitted in the Neuro General Ward and the Surgical Intensive Care Unit 2 at Fortis Escorts Hospital Jaipur.

2.3.3 Data Source –

Secondary Data from the case files.

Primary Data from the forms filled by the Infection Control Nurse.The study incorporates all the inpatients admitted in the Neuro General Ward and Surgical Intensive Care Unit 1 of the Fortis Escorts Hospital Jaipur.

The source of data includes secondary data from the files of all inpatients in the Neuro General Ward and Surgical Intensive Care Unit 1 of the Fortis Escorts Hospital Jaipur.

Facility survey is performed by using structured questionnaire. Primary data is the questionnaires used to be filled for the Hand Hygiene Practices.

2.3.4 The data collection procedure :

The data used for the study has been collected from the Medical Records Department of Fortis Escorts Hospital Jaipur.

Catheter-associated urinary tract infection must meet one of the following criterions:

- Patient had an indwelling urinary catheter within 7 days before the culture.
- Patient has a positive urine culture, that is, ≥105 microorganisms/ml of urine with no more than two species of microorganisms.
- Patient has no fever (>38° C), urgency, frequency, dysuria, or suprapubic tenderness.

- **Formula Used :**

✓ **CAUTI Rate =** Number of Incidences / Total number of catheter days * 1000

✓ **Numerator Data =** Number of Incidences

✓ **Dinominator Data =** Total number of catheter days or Device days and patient days.

✓ **Compliance of Hand Hygiene =** Total no. of acts of Hand Hygiene when the opportunity existed / Total no. of Hand Hygiene opportunities * 100

✓ **Numerator Data =** Total no. of acts of Hand Hygiene when the opportunity existed

✓ **Dinominator Data =** Total no. of Hand Hygiene opportunities

2.4 FINDINGS:

Table 4 : Incidence For the year 2009 and year 2010

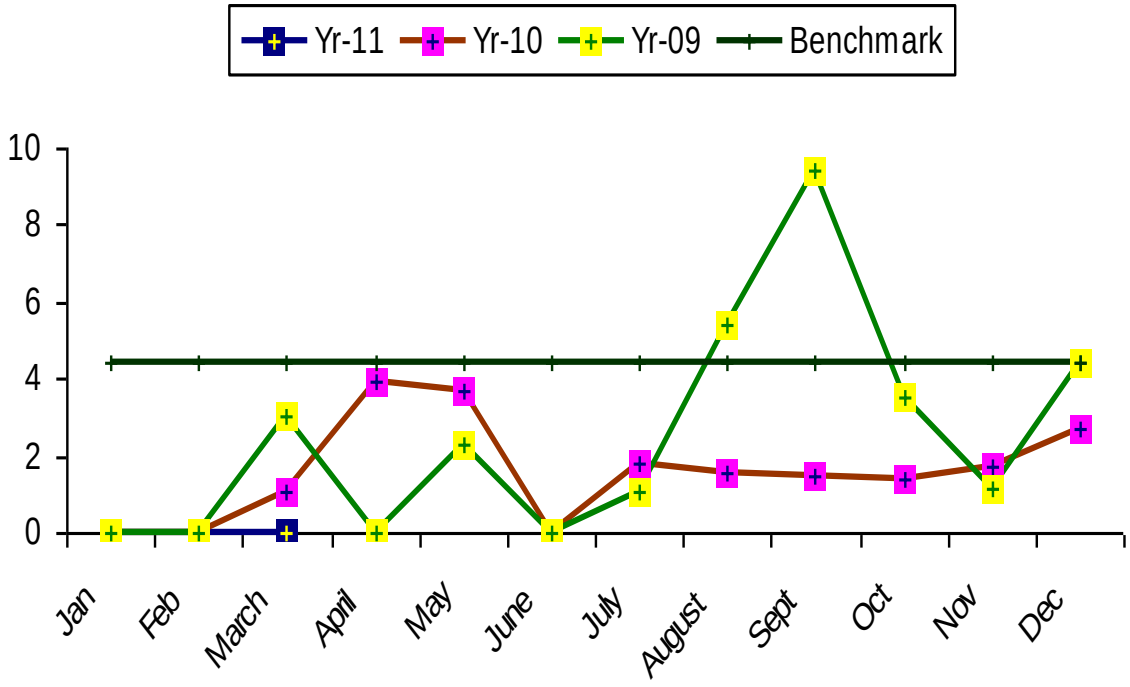
Incidence (Year)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
2009	0	0	3	0	4	0	4	5	7	3	1	1
2010	0	0	1	4	4	0	2	2	2	2	2	3

After applying the formula for the various incidences above. The rates were obtained as under :

Table 5 : CAUTI Rate for the year 2009 and year 2010

CAUTI Rate (Year)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
2009	0	0	3.03	0	2.32	0	1.04	5.43	9.4	3.49	1.17	4.4
2010	0	0	1.04	3.91	3.69	0	1.81	1.56	1.50	1.4	1.75	2.7

GRAPH 1 : CAUTI RATE

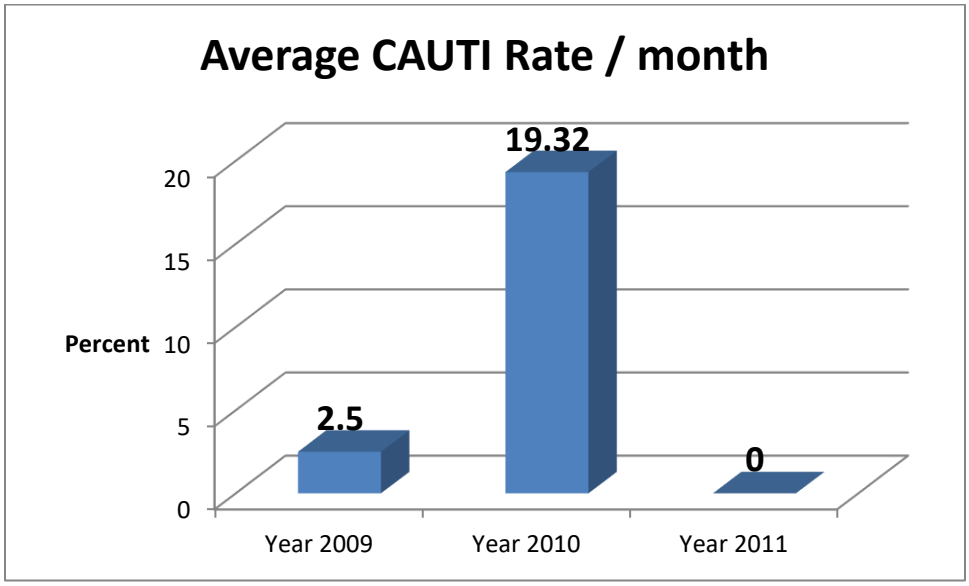


Once the rates were obtained various interventions were implemented as mentioned below .

Table 6 : Average Rate of Catheter Associated Urinary Tract Infection per month :

Year	Average Hand Hygiene Compliance / month
2009	**2.5**
2010	**19.32**
2011	**0**

GRAPH 2 : Average CAUTI Rate / month :



The graph given above presents the rate of CAUTI as an average per month.

GRAPH 3: HAND HYGIENE COMPLIANCE

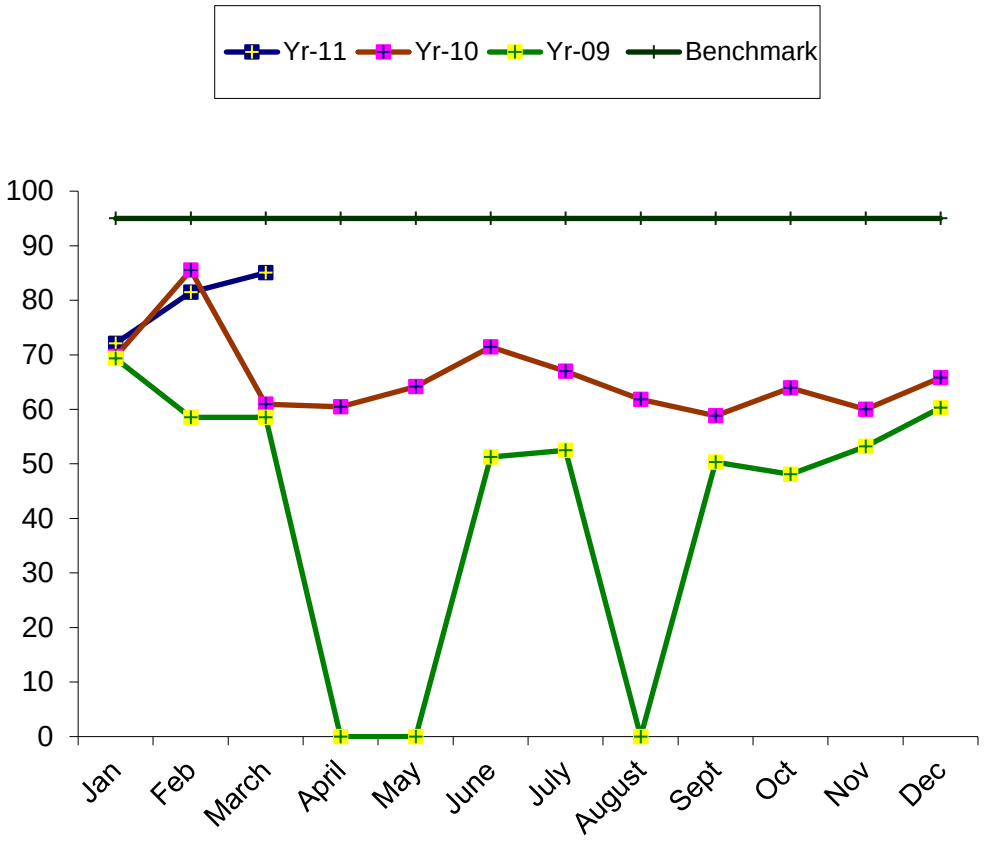


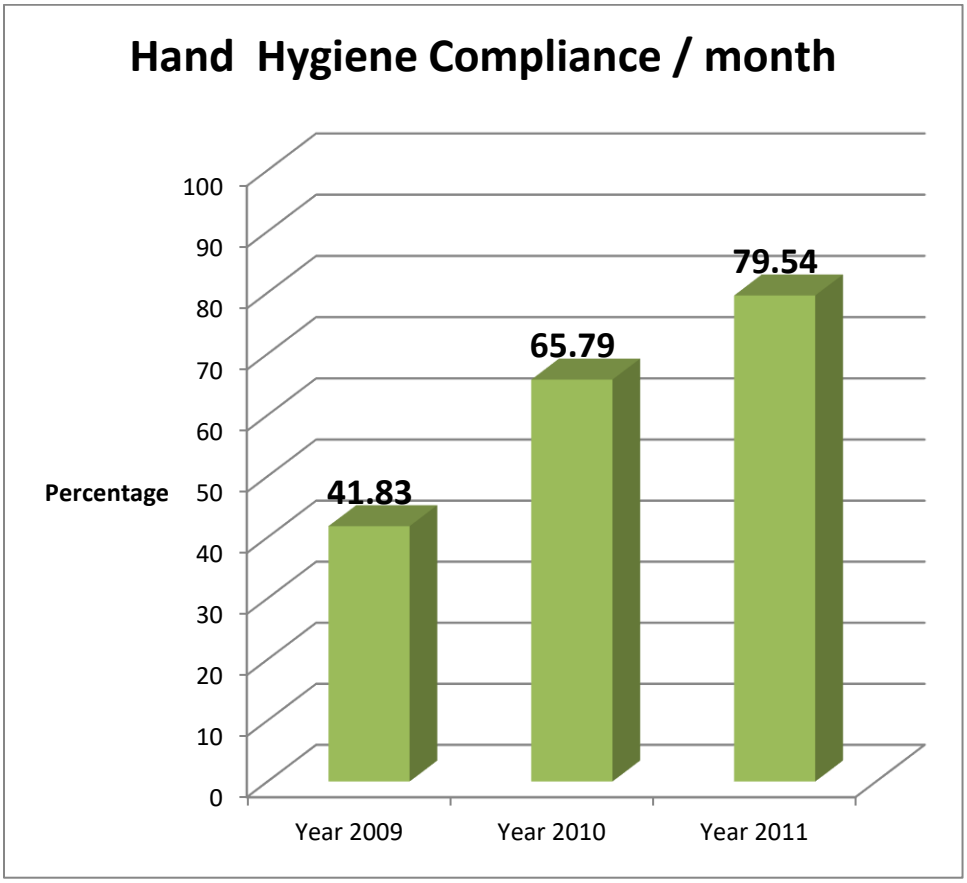
Table 7: HAND HYGIENE COMPLIANCE 2009 & 2010.

Year	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
2009	69.31	58.52	58.52	-	-	51.26	52.49	-	50.29	48.1	53.17	60.32
2010	69.7	85.5	60.95	60.48	64.15	71.42	67	61.81	58.82	63.91	60	65.82

Table 8: Average Hand Hygiene Compliance per month :

Year	Average Hand Hygiene Compliance / month
2009	41.83 %
2010	65.79 %
2011	79.54 %

GRAPH 4 : Hand Hygiene Compliance 2009, 2010, 2011 :



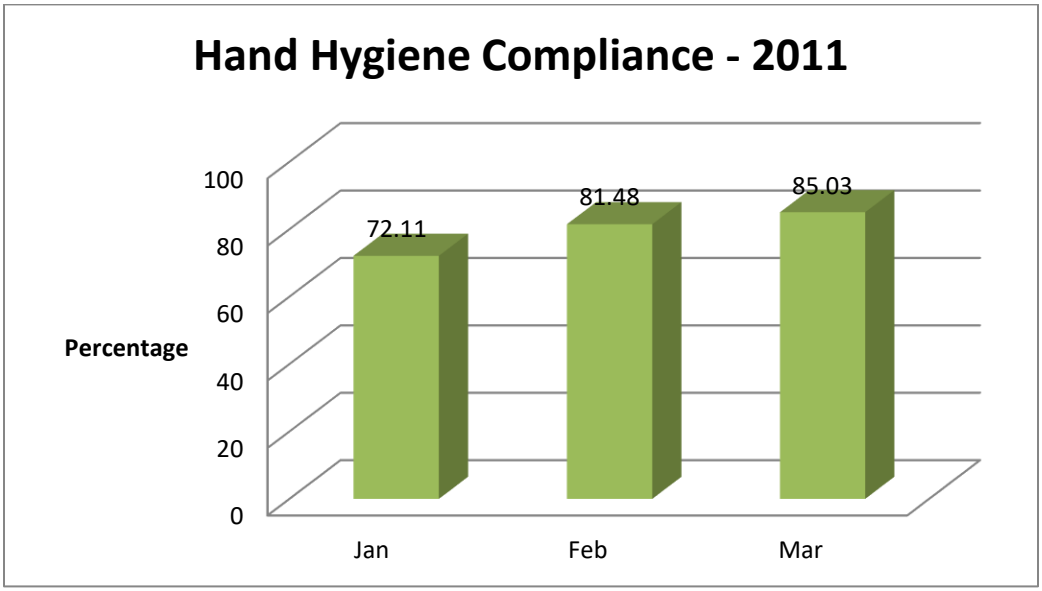
2.5 DISCUSSION:

After performing the interventions the following output was obtained.

Table 9: Hand Hygiene Compliance for the year 2011

Year 2011	Jan	Feb	Mar
Hand Hygiene Compliance	72.11	81.48	85.03

GRAPH 5 : HAND HYGIENE COMPLIANCE - 2011



And finally the incidence of Catheter Associated Infection fell down to zero during the three months of interventions. As indicated in the table below:

Table 10: Incidence and CAUTI Rate for the year 2011

Year 2011	Jan	Feb	Mar
CAUTI Incidence	0	0	0
CAUTI Rate	0	0	0

2.6 CONCLUSION:

1. **Strict implementation of care bundles.**
2. **Regular monitoring & feedback.**
3. **Commited efforts of nursing staff of SICU-2 and Neuro general ward brought about a remarkable reduction in the incidence of CAUTI.**

Finally, No incidence of CAUTI in last 3 months.

2.7 RECOMMENDATIONS:

1. <u>Urinary catheter Insertion Bundle (in the form of checklist)</u>

1. Perform hand hygiene immediately before procedure.
2. Maintain maximum aseptic technique.
3. Use pre-prepared set.
4. Use the smallest suitable catheter size.
5. Experienced personnel should do the procedure(had previously inserted more than 5| catheters)
6. Secure the catheter properly.
7. Maintain close sterile drainage system.

2. <u>CAUTI maintenance Bundle (Daily Reminder Checklist)</u>

1. Daily review of the need for the urinary catheter.
2. Keep catheter continuously connected to the drainage system
3. Ensure patients are aware of their role in preventing UTI.
4. Daily metal hygiene.
5. Empty urinary drainage bags regularly each into a clean container.
6. Hand hygiene before and after manipulating catheters.

3. <u>Reinforcement on Hand Hygiene</u>

4. <u>Continous on the floor training</u>

PREVENTIVE MEASURES TO CONTROL NOSOCOMIAL INFECTIONS:

- It is important to reduce the number of pathogens to which patients are exposed by using

  - ✓ Aseptic techniques.
  - ✓ Handling contaminated materials carefully.
  - ✓ Insisting on frequent and conscientious hand- washing.
  - ✓ Educating personnel with basic infection control measures.
  - ✓ Using isolation rooms and wards.

Tubes used to bathe patients should be disinfected between uses so that bacteria from the previous patient will not contaminate the next one.

- Respirators and humidifiers provide both a suitable growth environment for some bacteria and a method of airborne transmission.
- These sources of nosocomial infections must be kept scrupulously clean and disinfected.
- Materials used for bandages and intubation (insertion of tubes into organs, such as the trachea) should be sterilized prior to use.
- Packaging used to maintain sterility should be removed aseptically.
- Physicians can help improve patients' resistance to infection by prescribing antibiotics only when necessary, avoiding invasive procedures if possible, and
- Minimizing the use of immunosuppressive drugs.

Universal Precautions:

1. Use of barrier methods:

    i. Gloves, masks, face sheet.ii

    ii. Protective eye wear, gown, apron etc. Handle the blood of all patients as potentially infectious.

2. Hand and skin washing

3. Prevention of injuries from sharps

4. Beware of your own skin contions

5. Hospital waste management

6. Adequate resuscitative devices

7. Caution to pregnant women

8. Notification of accidents

9. Information Education and communication

10. Radiation hazards

(National Guidelines for Clinical Management of HIV/ AIDS NACO, GOI)

- Wash hands before and after each patient or specimen contact.
- Handle the blood of all patients as potentially infectious.
- Wear gloves for potential contact with blood and body fluids.
- Place used syringes immediately in nearby impermeable container; DO NOT recap or manipulate needle in any way.
- Wear protective eye wear or mask if splatter with blood or body fluids is possible e.g. during bronchoscopy, oral surgery, etc.

2.8 REFERENCES:

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