A Study on Hospital Acquired Infection and Prevention in Intensive Care Units

Internship Training
at
Heritage Hospital, Varanasi
(3rd February-30th April 2014)

By
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Under the guidance of
Dr. Alok Kumar Mathur

Post Graduate Diploma in Hospital & Health Management
2012–14

Institute of Health Management Research
Jaipur
2014

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TO WHOMSOEVER MAY CONCERN

This is to certify that Dr.Priyanka Singh student of Post Graduate Diploma in Health and Hospital Management (PGDHM) from Institute of Health Management Research, Jaipur has undergone internship training from 3rd February 2014 to 30th April 2014.

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

The Internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.

Dr Ashok Kaushik
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This is to certify that Dr Priyanka Singh, a student of IIHMR, Jaipur was permitted to undertake a project on "A study on Hospital Acquired Infection and Prevention at Heritage Hospital" for the duration of

3 month wef February to April 2014.

She has duly completed the study and Project report has been submitted.

Place : Varanasi
Dated : 25 May 2014

Col (Dr) P Sengupta (Retd)
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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled "**A study on Hospital Acquired Infection and Prevention in Intensive Care Units**" in Heritage Hospital Varanasi, submitted by Dr.Priyanka Singh, Enrollment No. IIHMR/PGDHM/2012-14/17-1358 under the supervision of Dr.Alok Mathur (Associate Professor, IHMR Jaipur) for award of Postgraduate Diploma in Health and Hospital Management of the Institute carried out during the period from 3rd February 2014 to 30th April 2014 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Priyanka Singh

Signature

DECLARATION

I Dr. Priyanka Singh student of Indian Institute of Health Management Jaipur declare that the project entitled "A Study on hospital acquired infection and prevention in Heritage hospital Varanasi" has been completed under the guidance of Col (Dr) P.Sen Gupta Medical superintendent Heritage hospital Varanasi from 3 Feb to 30 April 2014.The findings generated in the project work are based on the information collected by me and are solely meant for the academic purpose.

I also declare that I will not be using the data and finding anywhere else, it will be purely for project report to be submitted in the college.

Dr.Priyanka singh

IIHMR,JAIPUR

ACKNOWLEDGEMENT

I extend my deep appreciations and gratitude to all those who directly or indirectly Contributed to the completion of the report "STUDY ***ON HOSPITAL ACQUIRED INFECTION AND PREVENTION in ICUs".***

I take this opportunity to personally thank all those people without whose interest, time and assistance this report would not have been possible. First of all I would like to acknowledge the invaluable help and support of Dr. P.Sen Gupta and the Director of Heritage Hospital Varanasi Mr. Anshuman Rai who gave me the permission and required authority to proceed with study. Their expertise really helped me in taking the right towards the completion of this report. I wish to express my sincere thanks to Mrs. Annammasaju & Mr.N P Tiwari Nursing Superintendent who provided me with valuable inputs regarding our report from time to time. They were really helpful and supportive. Finally I would like to thanks all Hospital staff members who provide me with the correct information to the best of their knowledge.

I acknowledge the contribution of **Dr. S.D. Gupta, Director, IIHMR,Col(Dr) Ashok Kaushik, Dean, IIHMR** and my college guide **DR. Alok Mathur.**
and mentor **DR.Vijay pratap raghuvansi** in completion of the project right from the beginning. Without their guidance, it would not been possible to complete the study I would end this note of thanks by acknowledge the support of all those who took the time out from their busy schedule and contributed invaluable toward the completion of this report.
By the help of these fine people and inestimable support and faith of our parents we were not able to bring about these results

Dr.Priyanka singh

CERTIFICATE

It is certified that the work contained in the project entitled "A study on hospital acquired infections prevention" has been carried out under my supervision, and this work has been not submitted elsewhere.

Col(Dr) P. Sen Gupta

(Medical Superintendent)

HERITAGE HOSPITAL, VARANASI

CONTENTS:-

S.NO.	TITLE	PAGE NO.
	Declaration	
	Acknowledgement	
	Certificate	
	Abbreviations	
1.	**PART-1 INTERNSHIP**	
1.1	Objective of Internship	
1.2	Hospital Profile	
2.	**PART-2 DISSERTATION**	
2.1	Introduction of the study	
2.2	Problem Statement	
2.3	Objective	
2.4	Review of Literature	
2.5	Research Methodology	
	2.5(a) Study Design	
	2.5(b) Data collection tools	
	2.5(c) Study time	
	2.5(d) Study methodology	
	2.5(e) Study data	
2.6	Data Analysis	

2.7	Recommendations	
2.8	References	
2.9	Annexure	
3.0	Data Table	

Abbreviations:-

S.NO.	Abbreviated form	Full Form
1.	HAI	Hospital Acquired Infection
2.	ICU	Intensive Care Unit
3.	MICU	Medical Intensive Care Unit
4.	SICU	Surgical Intensive Care Unit
5.	PICU	Pediatric Intensive Care Unit
6.	NICU	Neonatal Intensive Care Unit
7.	ISO	International Organization for Standardization
8.	MRI	Magnetic Resonance Imaging
9.	CT SCAN	Computed Tomography Scan
10.	WHO	World Health Organization
11.	CCU	Coronary Care Unit
12.	LBW	Low Birth Weight
13.	HIV	Human Immunodeficiency Virus
14.	CSSD	Central Sterile Supply Department
15.	IPD	In-patient Department
16.	CDC	Center for Disease Control
17.	CSF	Cerebral Spinal Fluid
18.	ET TUBE	Endo Tracheal Tube

INTRODUCTION OF THE STUDY

Hospital is the place of cure

"Infections Are Most Often Transmitted From Patient To Patient On The Hands Of Healthcare Workers…"

This is what comes to our mind when we think about a hospital treating the patients under same roof was considered as a revolutionary idea and was expected that it will ease the job of healing. But it turns wrong because of treating the patients under same roof was considered as a revolutionary idea but as expected knowledge on sterilization and antisepsis was not there. Gangrene and death were almost mandatory for the patients suffering from wounds. This lead into development of new discipline which was dealing with the nosocomial infections (Hospital–acquired infections).The word hospital is closely related to the word hospitality and is derived from the word 'hospice' which means a place for refuge, a house for rest. Various functions of a hospital are as follows:

1. Care of the sick and injured
2. Education of physician, nurses, paramedical and other personnel
3. Public health –disease prevention and health promotion
4. Research

Nosocomial comes from the Greek word *nosokomeion* meaning hospital (*nosos* = disease, komeo= to take care of) therefore Nosocomial infections are defined as infections which is a result of treatment in a hospital or a healthcare service unit, but secondary to the patient's original condition. Infections are considered nosocomial if they first appear 48 hours or more after hospital admission or within 30 days after discharge. As per the WHO definition it is an infection acquired in hospital by a patient who was admitted for a reason other than that infection. An infection occurring in a patient in a hospital or other health care facility in which the infection was not present or incubating at the time of admission. This includes infections

acquired in the hospital but appearing after discharge and also occupational infections among staff of the facility knowledge on sterilization in each and every field of healthcare.

In 1861,Semmelwis1 observed the association of Puerperal sepsis with the attendants on patients by medical officers and students and he was successful to bring a dramatic reduction in infection rate by the introduction of hand washing with chlorinated lime. After her experience of hospital sepsis, Florence Nightingale (1863) wrote in her book Notes on hospitals, ……the very first requirement in a hospital that it should do the sick no harm ….the actual mortality in hospitals, especially in those of large crowded cities, is very much higher than any calculation founded on mortality of the same class of disease among patients treated outside hospital Lord Lister (1867) introduced his antiseptics surgery with the extensive use of carbolic acid. Hospital – acquired infections also called nosocomial infections are defined as infections developing in the patients after admission to hospital , which were neither present nor in incubation at the time of hospitalization .Such infections may manifest during their stay in hospital or, sometimes , after the patient is discharged .Patient in hospital are likely to get sick due to a new variety of microorganisms responsible for wide spectrum of hospital infection, bacterial isolates of more resistant to standard antibiotic therapies, patient clustered in specialized units and a variety of health care providers directly involved in patient care.

It is the responsibility of health care providers to ensure an adequate arrangement to control the risk of infection. Since infection control is the quality standard of patient care, it is essential wellbeing of patients and safety of both patients and health care workers in a population. Also, infection control measures are to be viewed as a priority and have to be fully integrated into the continuous process of improvement of quality care.

PROBLEM STATEMENT

Patient care is provided in facilities which range from highly equipped clinics and technologically advanced university hospitals to front-line units with only basic facilities. Despite progress in public health and hospital care, infections continue to develop in hospitalized patients, and may also affect hospital staff. Hospital has increasingly become unsafe place for patient during their stay. Infection is a health hazard of great expense and significance affecting the final outcome of treatment.

OBJECTIVE

- To find out the causes of hospital acquired infection in Intensive Care Units of the hospital.

REVIEW OF LITRATURE

Hospital-acquired infections (HAIs) (also called "nosocomial infections" or "health-care-associated infections") are infections that a patient acquires while in hospital being treated for some other condition. They have a significant impact on both patients and the province's health system.

For patients, the impact of such infections can range from longer hospital stays to more serious conditions that may require surgery or result in negative long-term health effects. In severe cases, HAIs can cause death. For the health-care system, such infections increase treatment costs and result in longer wait times for a hospital bed for other patients. Some HAIs are infectious diseases that can spread throughout a hospital. According to Baveja2 the term hospital acquired infection, hospital– associated infection, hospital infection is defined as infection developing in patients after admission to the hospital ,which was neither present nor in the incubation period at the time of hospitalization . Such infections may become evident during their stay in the hospital or sometimes after their discharge.

Dancer depicts that many microorganisms associated with hospital-acquired infections display two particular features; firstly, they are pathogens of well established medical importance and secondly, they can withstand the rigorous of the hospital environment .It benefits them to survive outside temperature human tissues because an appropriate environment niche will provide shelter until some timely mechanisms facilitates their transfer back to patients. Not all of them demonstrate this capacity; some originate from the patient's own flora, especially those who are immune compromised and others can survive only in human tissues and thus rely upon person-to person spread in order to disseminate.

Weinstein says that HAI infections typically affect patients, who are immune compromised because of age, underlying diseases, or medical or surgical treatment HAI infection rates in adult and pediatric ICU are approximately three times higher than elsewhere in hospitals. The site of infection and the pathogens involved are directly related to treatment in ICUs.

As per Weber and researchers the patients hospitalized in ICUs are 5 to 10 times more likely to acquire HAI infections than other hospital patients.

The frequency of infections at different anatomic sites and the risk of infection varies by infection site. Contributing to the seriousness of HAI infections, especially in ICUs, is the increasing incidence of infections caused by antibiotic-resistant pathogens.

OPERATIONAL DEFINITIONS

Hospital acquired infection:

An infection acquired in a patient in a hospital or other facility in whom it was not present or incubating at the time of admission or the residual of an infection acquired during a previous admission.

Infection:

Infection is the lodgment and multiplication of organisms in the host.

Decontamination: It is a process which removes or destroys micro-organisms to render an object safe for use. It includes cleaning, disinfection and sterilization.

Cleaning:

It is a process that removes foreign material (e.g. soil, organic material, microrganisms.

Disinfection:

It is a process that reduces the number of pathogenic micro-organisms, but not necessarily bacterial spores, from inanimate objects or skin, to a level which is not harmful to health.

Sterilization:

It is a process by means of which an article, surface or medium is made free from all living microorganisms including spores.

CLASSIFICATION OF HOSPITAL ACQUIRED INFECTIONS:-

(In the words of Slack HAI classified as)

- Infection contracted and developing outside the hospitals and require admission to the hospital (e.g. pneumococcal pneumonia).

- Infections contracted outside, but clinically apparent when the patient is in the hospital (e.g. chickenpox or zoster).

- Infections contracted, and developing when the patient is in hospital (e.g. device-associated bacteraemias).

- Infections contracted within the hospital, but not becoming clinically apparent until after the patient has been discharged (e.g. many postoperative wound infection).

- Infections contracted by hospital staff as a consequence of their work, whether or not this involves direct contact with patients (e.g. hepatitis B).

Routes of transmission:-

- Airborne Transmission
- Common vehicle Transmission
- Contact Transmission
- Droplet Transmission
- Vector borne Transmission

AIR BORNE TRANSMISSION:-

- Tiny droplet nuclei (< 5 microns) that remain Suspended in the air.
- Dusts from Bedding & Floor.
- Exudates Dispersed From Wound.

COMMON VEHICLE TRANSMISSION:-

- Transmitted indirectly by material contaminated with the infectious microbes.

Example- Contaminated food and water, blood products, instruments and other items.

Therefore, hand washing and cleaning and disinfecting surfaces that patients and hospital staff come into contact with (including patient's rooms and medical equipment) are critical in preventing the spread of these infections.

CONTACT TRANSMISSION:-

Most important and frequent mode of transmission of HAI. It is divided into two subgroups:-

- Direct-contact transmission
- Indirect-contact transmission

DROPLET TRANSMISSION:-

Droplets generated by:-

- Coughing
- Sneezing
- Respiratory tract procedures.
- Secretions

VECTOR TRANSMISSION:-

- Transmitted through insect & other invertebrate animals.
- Examples: mosquitoes can transmit “malaria” and “yellow fever”.
- Fleas can transmit “plague”.

STUDIES AND INCIDENCE CONDUCTED ON HOSPITAL ACQUIRED INFECTION

In the words of Inweregbu and others, intensive care units have the highest prevalence of hospital-acquired infections in the hospital setting. The European Prevalence of hospital acquired infection in Intensive Care Study (EPIC), involving over 4500 patients, demonstrated that the hospital acquired infection prevalence rate in ICU was 20.6 % .ICU patients are particularly at risk from hospital acquired infections as a result of mechanical ventilation, use of invasive procedures and their immune compromised status.

According to Rosenthal and his colleagues13 ,hospital acquired infections are an important public health problem in the developing countries, particularly in the Intensive Care Unit (ICU) setting. They performed a prospective hospital acquired infection surveillance study during the first year of an infection control program in six Argentinean ICUs. Hospital acquired infections were identified using the Centers for Disease Control and Prevention National HAI Infections Surveillance System definitions, and site-specific HAI infections rates were calculated .The rate of catheter-associated bloodstream infections in medical- surgical ICUs was 30.3 per 1,000 device days; it was 14.2 per 1,000 device-days in Coronary Care Units (CCUs). The rate of ventilator-associated pneumonia in medical- surgical ICUs was 46.3 per 1,000 device; it was 45.3 per 1,000 device-days in CCUs .The rate of symptomatic catheter associated urinary tract infections in medical- surgical ICUs was 18.5 per 1,000 device days ; it was 12.1 per 1,000 device –days in CCUs .The rate of nosocomial infections in Argentinean ICUs found during

surveillance suggested that ongoing targeted surveillance and implementation of proven infection control strategies is needed in developing countries such as Argentina.

According to Al-Fallouji14,Senic (the study on the efficiency of nosocomial infection control) audit report from Georgia, USA on 33,8000 patients, published in1983, the commonest site was urinary tract, but most expensive in terms of treatment, cost and hospital discharge was wound infection, average cost was $ 1800 per infection (though the hospital was reimbursed only $15) with a maximum of $42,000. the most expensive nosocomial infection were pneumonia (average cost $3000 and maximum $9000) wound infection (average cost $3000 and maximum $26000) and urinary tract infection (average cost $600 and maximum $8000).The Senic audit also demonstrated that a small reduction in USA infection rates from 5% to 7% could cover costs of employing a team consisting of an infection control nurse, a part time17_epidemiologist with clinical assistance and expenses. The study concluded that surveillance and reporting of wound infection to surgeons are of great importance in prevention of post-operative
wound infection with better awareness, improved techniques, teaching and good infection control.

Rudra and Rudra 15 reported that in the European Prevalence of Infection in Intensive Care (EPIIC) study, 21 % of patients had an infection directly related to their admission to ICU. They prolong the hospital stay and increase morbidity and mortality by approximately 300 %. The incidence of nosocomial infection is highest in burn units, surgical ICUs and ICUs for low birth weight (LBW) neonates (15-30 %), intermediate in medical and pediatrics ICUs (5-10 %) and lowest in Coronary Care Units (1-2%). The infection rate may low in the early days of ICU stay, but can increase up to 80 % as the duration of stay exceeds 5 days or more.

According to Burke 16, hospital acquired infection are today by far common complications affecting hospitalized patient. Currently, between 5 to 10 % of patients admitted to acute care hospital acquire one or more infections, and the risks have steadily increased during recent decades. These adverse events affect approximately 2 million patients each year in the United States, results in some 90,000 deaths, and add an estimated $ 4.5 t0 $ 5.7 billion per year to the costs of the patient care.

Pathological agents important in HAI

There are some bacteria and viruses like E-Coli, Staphylococcus aureus, Pseudomonas, Candida, Klebsiella etc each of them can be transmitted through contact (touching an infected person or a surface where the bacteria live).

Classification of pathogenic germs

Conventional pathogens:-

Cause disease in healthy individuals in the absence of specific immunity. Examples: Staphylococcus aureus, Streptococcus pyogenes, Salmonella sp. Shigella sp, Corynebacterium diphtheriae, Mycobacterium tuberculosis, Bordetella pertussis, hepatitis A and B viruses, rubella virus, rotaviruses, Human Immunodeficiency Virus (HIV).

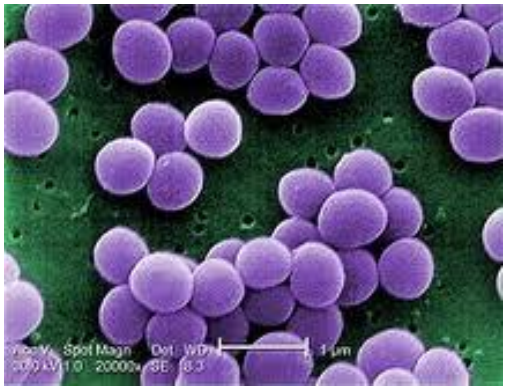
Conditional pathogens:-

Cause disease, other than trivial local infections, only in persons with reduced resistance to infection (including newborn infants) or when implanted directly into tissue or a normally sterile body area. Examples: Streptococcus agalactiae, Enterococcus sp., Clostridium tetani, Escherichia18_coli, Klebsiella sp., Serratia marcescens, Acinetobacter baumanii, Pseudomonas aeruginosa, Candida sp.

Opportunistic pathogens:-

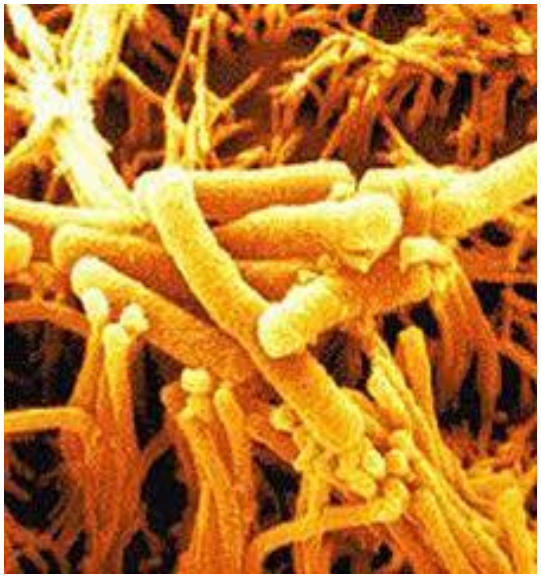
Cause generalized disease, but only in patients with profoundly diminished resistance to infection. Examples: atypical mycobacteria, Nocardia asteroids, Pneumocystis carinii.

BACTERIA

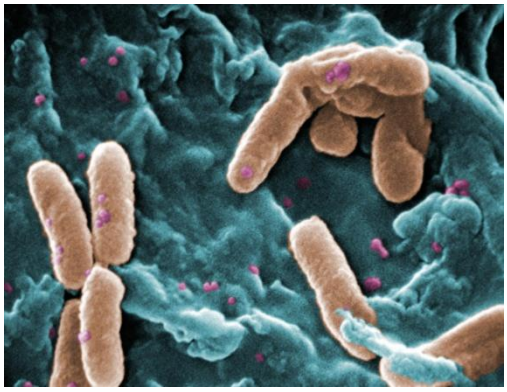


STAPHYLOCCUS AUREUS

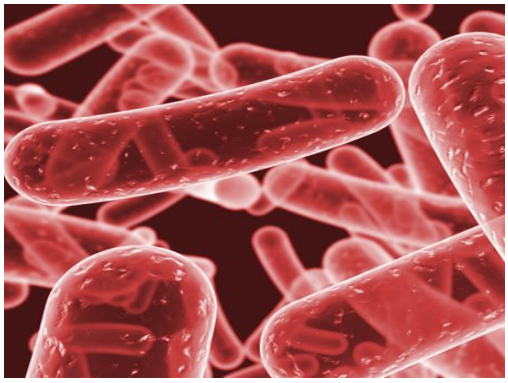
ESCHERICHIA COLI



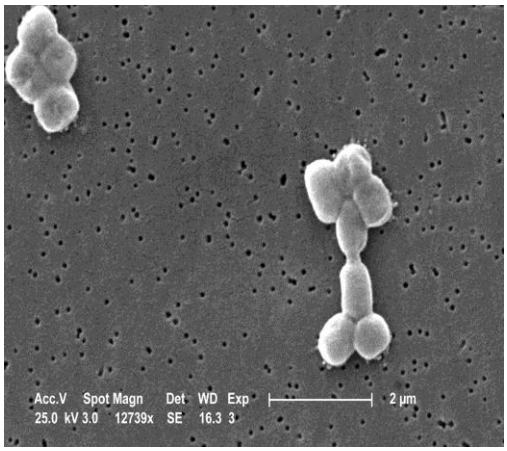
PSUDOMONAS AEUROGINOSA



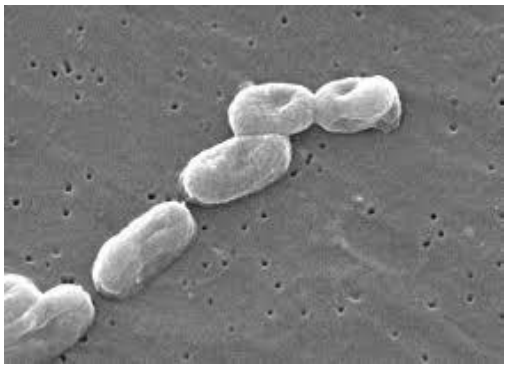
PSEUDOMONAS



KLEBSIELLA



ACINOBACTER BAUMANNIL

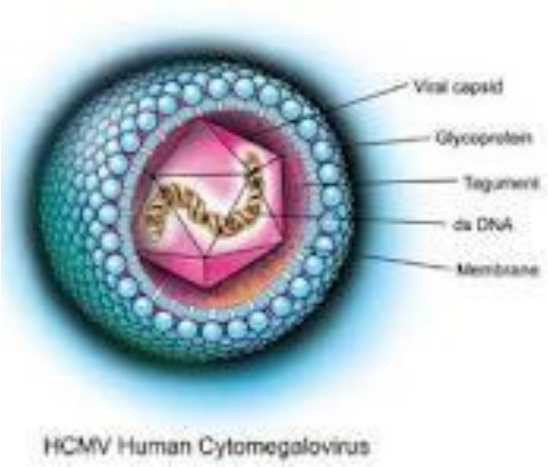


BURKHOLDE CEPACIA

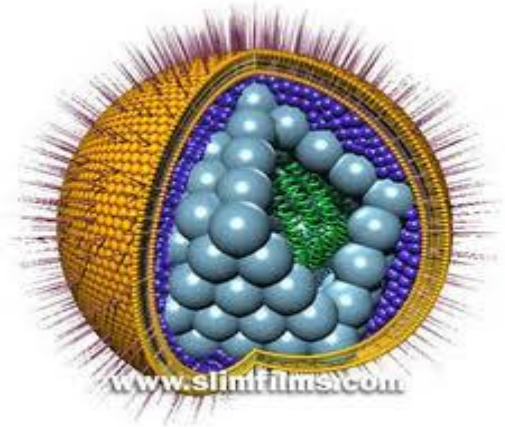
Virus

There is a possibility of HAI transmission of-

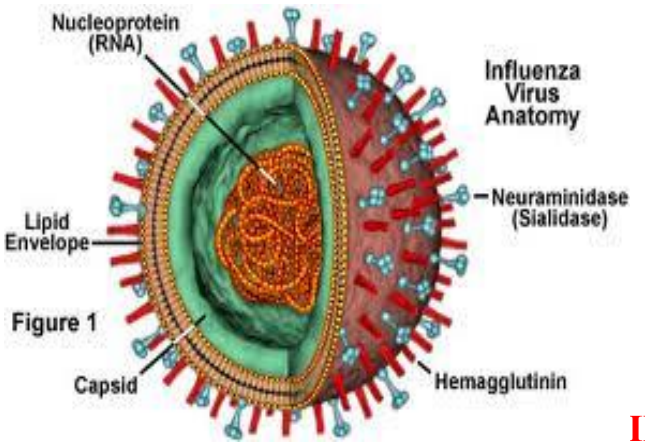
- Hepatitis B & C viruses (transfusion , dialysis, injection, endoscopy)



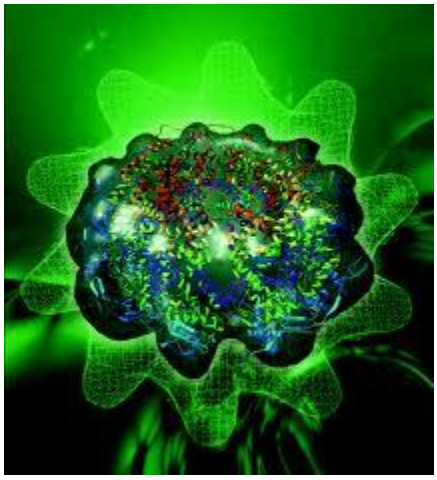
CYTOMEGALO VIRUS



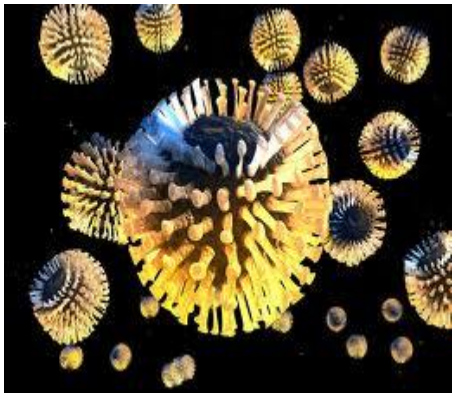
HERPES VIRUS



INFLUENZA VIRUS



RESPIRATORY SYNCTYIAL VIRUS



ROTAVIRUS

PARASITES AND FUNGI

Many of them are lethal organisms and cause infection during extended antibiotics treatment and severe immune suppression.

- *Candida albicans,Aspergillus* species
- *Cryptosporidium,Toxoplasma pneumoniae*.

Reservoirs and transmission

Bacteria that cause HAI infections can be acquired in several ways:

- ENDOGENOUS
  Cause self infection or auto infection.
- EXOGENOUS
  Cross infection and environmental infection.

1. The permanent or transient flora of the patient
   (ENDOGENOUS INFECTION)

Bacteria present in the normal flora cause infection because of transmission to sites outside the natural habitat (urinary tract), damage to tissue (wound) or inappropriate antibiotic therapy that allows overgrowth (C. difficile, yeast sp.). For example, gram-negative bacteria in the digestive tract frequently cause surgical site infections after abdominal surgery or urinary tract infection in catheterized patients.

1. Flora from another patient or member of staff
   (EXOGENOUS CROSS-INFECTION)

(A) Through direct contact between patients (hands, saliva droplets or other body fluids).
(B) In the air (droplets or dust contaminated by a patient's bacteria).

(C) Via staff contaminated through patient care (hands, clothes, nose and throat) who become transient or permanent carriers subsequently transmitting bacteria to other patients by direct contact during care.

(D) Via objects contaminated by the patient (including equipment), the staff's hands, visitors or other environmental sources (e.g. water, other fluids, food).

2. Flora from the health care environment (Endemic or epidemic exogenous environmental infections). Several types of microorganisms survive well in the hospital environment:

In water, damp areas, and occasionally in sterile products or disinfectants (Pseudomonas, Acinetobacter, Mycobacterium)

- 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.
- In food
- In fine dust and droplet nuclei generated by coughing or speaking (bacteria smaller than 10m in diameter remain in the air for several hours and can be inhaled in the same way as fine

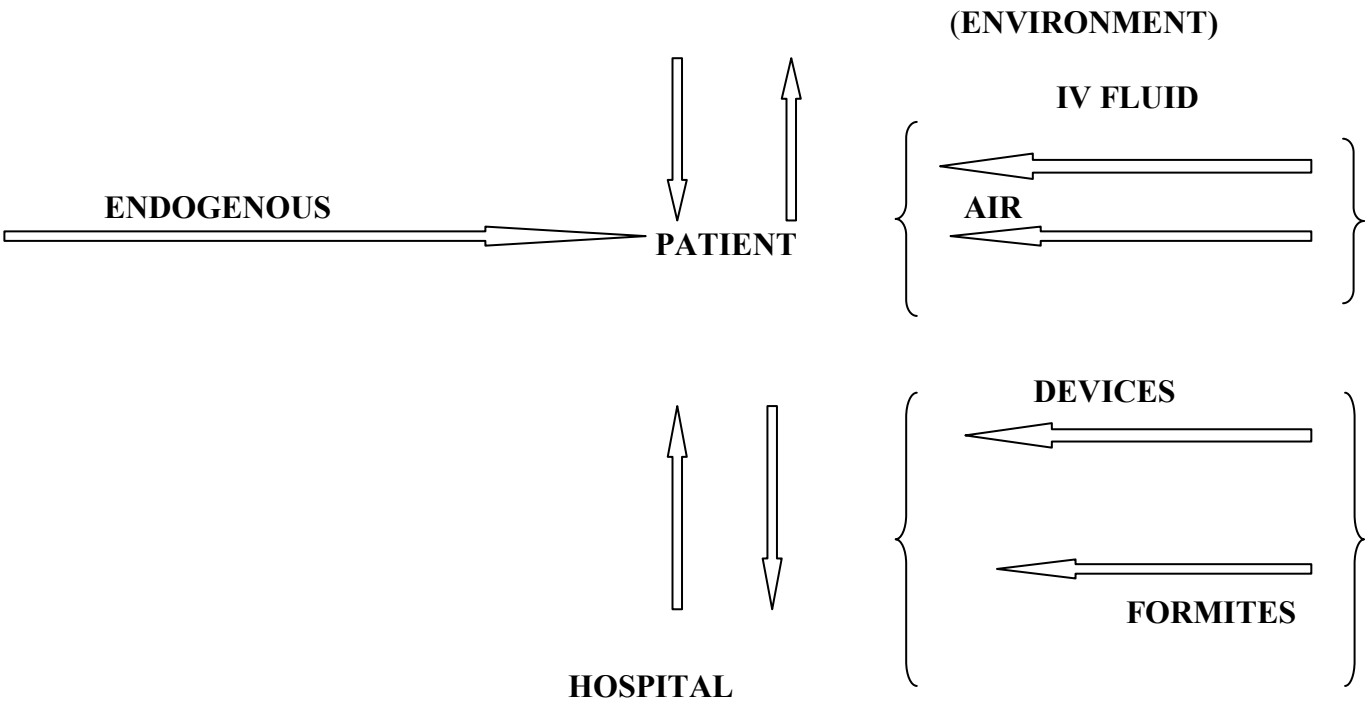
dust

ENDOGENOUS
(SELF INFECTION)

Sources Reservoirs	**Principal Pathogen**
Skin Nose	Staphylococcus aureus Staphylococcus epidermidis
Throat Mouth	Streptococcus pyogenes (Infrequent)
Bacteroides sp	Gram Negative Bacilli Intestine Clostridium sp
Tissues Infected site	Herpes virus Staphylococcus

Endogenous variables related to nosocomial infection

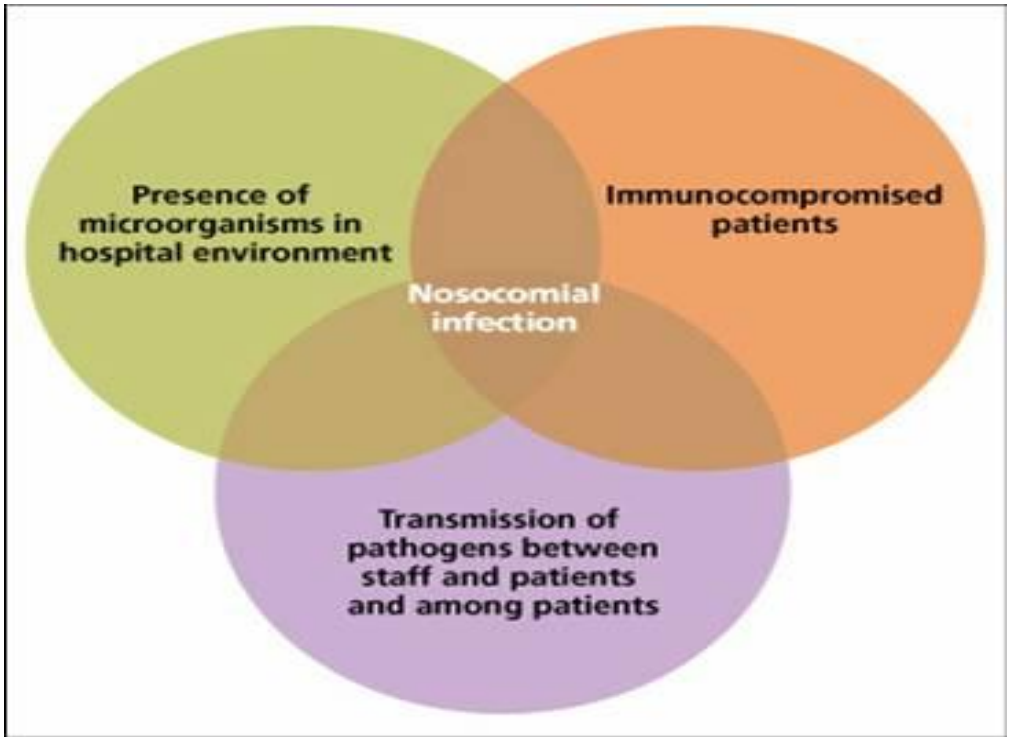
EXOGENOUS
(OTHER PATIENT)



The diagrammatic presentation of various exogenous and endogenous variables is depicted in the figure

HAI INFECTION FACTOR:-

- High prevalence of compromised hosts.
- High prevalence of pathogen.
- Efficient mechanisms of transmission from one to another.
  (This is also known as chain of transmission.)



Factors Predispose HAI:-

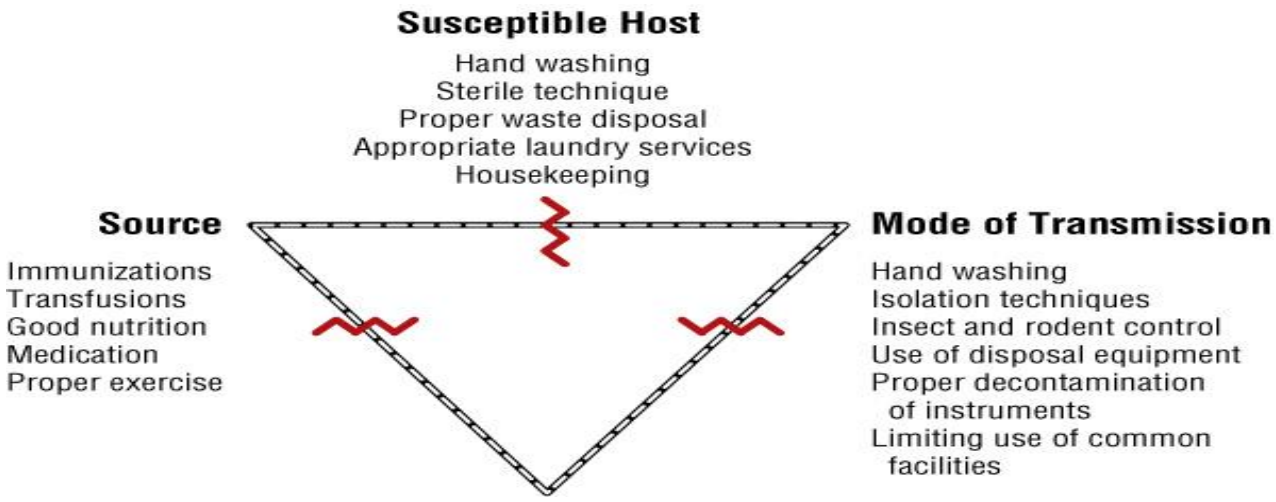
- Hospital Pathogen
- Poor Condition Of Hospital
- Crowding Of Patient's
- Instruments
- Extremes Of Age
- Immunity
- Contaminations

TABLE 5–6. Fomites Found in Health Care Facilities

Computer keyboards
Door knobs
Telephones
Countertops
Scrub suits
Phlebotomy trays
Eyeglasses
Pens and pencils
Water-faucet handles
Laboratory coats
Manuals and books
Phlebotomy supplies and equipment
IV equipment

Prevention of nosocomial infections:-

Prevention of nosocomial infections is the responsibility of all individuals and services providing health care. Everyone must work cooperatively to reduce the risk of infection for patients and staff. This includes personnel providing direct patient care, management, and physical plant ,provision of materials and products, and training of health workers. Infection control programmes are effective provided they are comprehensive and include surveillance and prevention activities, as well as staff training. There must also be effective support at the national and regional levels.



SITES OF INFECTION

Distribution according to the French national prevalence survey (1996)

Following are the most common HAI infections:

- Urinary tract
- Surgical Site
- Respiratory tract
- Bacteraemia

COMMON HOSPITAL –ACQUIRED INFECTION

Urinary tract infection:

Approximately 40 % of hospital- acquired infections (e.g., E.coli , S.epidermis Enterococcus , Klebseilla etc.) occur in the urinary tract and are usually associated with catheterization or instrumentation of urethra, bladder or kidneys.

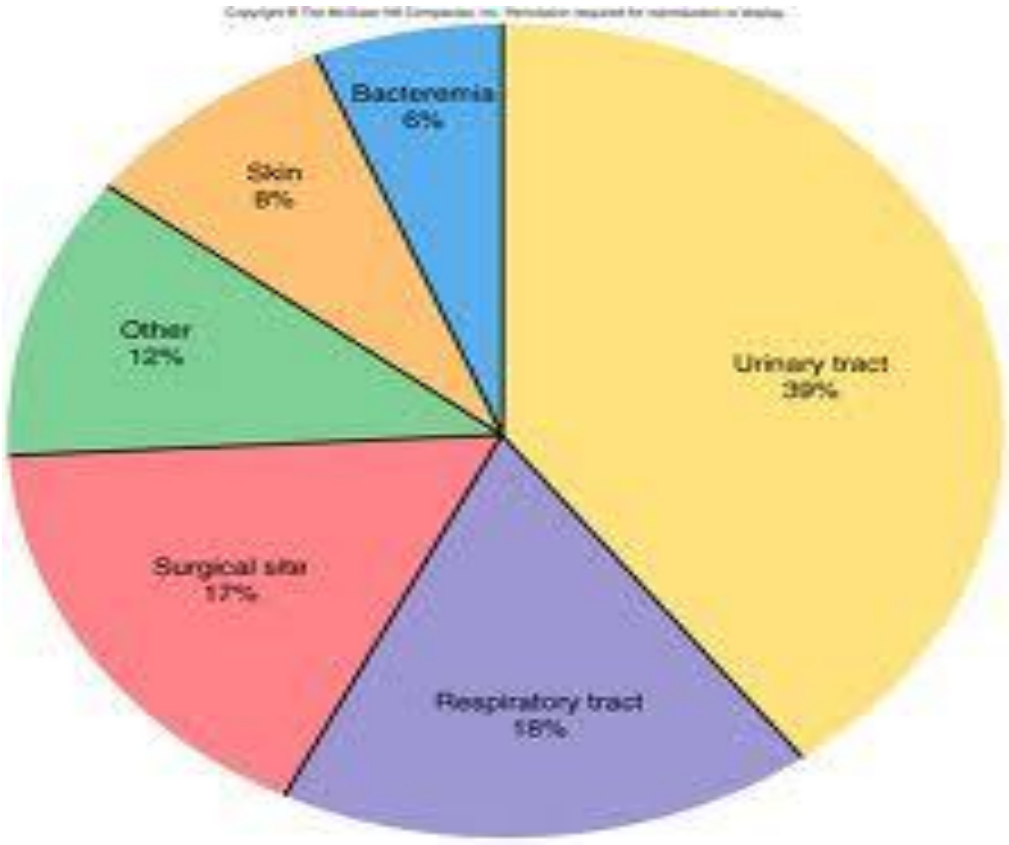
Infection of the lower respiratory tract:

Some 15 - 20 % of all hospital acquired infections are the lower respiratory tract which are the leading causes of mortality. The major pathogens include gram- negative bacilli and Staphylococcus aureus which replace the conventional pathogens ,such as streptococcus

pneumonia Wound and skin sepsis: Infection of the surgical wounds and other soft tissues account for about 18% of the hospital-acquired infections (e.g., S.aureus , P.aeruginosa).

Gastrointestinal infection:

e.g., food poisoning , Salmonella infection



National or regional programmes

The responsible health authority should develop a national (or regional) programme to support hospitals in reducing the risk of nosocomial infections.

Such programmes must:

- Set relevant national objectives consistent with other national health care objectives.
- Develop and continually update guidelines for recommended health care surveillance, prevention, and practice.
- Develop a national system to monitor selected infections and assess the effectiveness of Interventions.
- Harmonize initial and continuing training programmes for health care professionals
- Facilitate access to materials and products essential for hygiene and safety
- Encourage health care establishments to monitor nosocomial infections, with feedback to the professionals concerned.

The health authority should designate an agency to oversee the programme (a ministerial department, institution or other body), and plan national activities with the help of a national expert committee. Professional and academic organizations must also be involved in this programmer.

MANAGEMENT OF HOSPITAL ACQUIRED INFECTION

Management of hospital acquired infection is not an easy task; it requires education of health care personnel regarding infection control procedures and strict adherence to rules and policies of infection control.

Panigrahi mentioned that that organization of a nosocomial infection control is not an easy task. The three main supportive elements to be considered for the infection control programmers are:

(1) The development of an effective surveillance system.

(2) The development of policies to reduce risk of hospital acquired infection.

(3) The maintenance of a continuing education programmers for hospital personnel.

Surveillance of hospital acquired infection is very important and it should be continuous process consisting of elements i.e. definition of categories of infection, systematic case finding and data collection and tabulation of data, analysis and interpretation of data and reporting of relevant findings to individuals for appropriate action .The best way to carry out control programmers is to establish an infection control committee.

According to Weinstein, physician can contribute to infection control efforts by acting as role models for other personnel by paying careful attention to hand hygiene recommendations and barriers precautions during contact with patients and by observing posted isolation precautions giving corrective feedback to caregivers who do not adhere to hand-hygiene recommendations or isolation precautions, placing invasive device based on clinical need (not just on convenience), removing invasive device promptly when they are no longer needed clinically, limited surgical antimicrobial prophylaxis to the per-operative period , doing exercise care in initial empirical antibiotic selection (avoid “shot gun” approaches), narrow use of the spectrum of antibiotic therapy once a pathogen is recovered and discontinuing antibiotic therapy in a timely fashion and making familiar with the hospital’s blood borne pathogen and tuberculosis

control plans and making order of appropriate isolation precautions promptly for infected patients , alternate nursing staff to lapses in asepsis.
(e.g Soiled dressings at sites of intravascular catheters) and to infection predisposing situations (e.g aspiration – prone positioning of patients) during patient rounds and notifying infection-control practitioners of potential infection control problems (e.g surgical wound infections that manifests after a patient's discharge).

CLEANING, STERILIZATION AND DISINFECTION:

Proper infection control procedures need to be followed for both patient safety and health care personnel. Cleaning, sterilization and disinfection are important procedures need to be carried out for hospital infection control.
WHO guidelines recommended routine cleaning of hospital environment to ensure that environment is visibly clean, and free from dust and soil. There must be policies specifying the frequency of cleaning agents used for walls, floors, windows, beds, curtains, screens, fixtures, furniture, bath and toilets, all reused medical devices.

NABH standard recommended that there must infection control manual, which must be updated periodically. Equipment cleaning and sterilization must be included, an appropriate antibiotic policy must be established and implemented It also focused on adherence to standard precaution at all times.

Sleigh and Timbury mentioned that medical, nursing and ancillary staff must be educated in the basic concepts of infection control. All staff must follow good practice to minimize the risk to patients. E.g. Frequent hand washing is the important measure for preventing cross-infection Staff must be taught how to wash hands effectively. Staff suffering from infection, e.g. viral

respiratory infections, septic lesions, should be excluded from contact with patients. Staff should be protected by appropriate immunization
(e.g. BCG vaccine, Hepatitis B vaccine).

23, common chemicals used for disinfection are:-

- **Bleach 1 %-** solution should be distributed through out the hospital in plastic recyclable bottles for disinfection of materials contaminated with blood / body fluids.

- **Bleaching powder for** – for toilets, urinals, bathroom, etc.

- **Methylated spirits (70%)** – For disinfecting surfaces on which bleach cannot be used, e.g. smooth metal surfaces, table tops, etc.

- **Alcoholic hand wash (70 %) –** Methylated alcohol to which 1 % glycerine is added, available in all clinical settings.

- **Glutaraldehyde (2%)** –Cidex for disinfection of surfaces and instruments, which are destroyed by bleach, changed after 14 days.

- **Detergent with enzyme** – For cleaning endoscopes, theatre instruments and obstetric instruments before disinfection.

- **Savlon 1 %** - For cheatle forceps, solution to be changed every day.
  For effective disinfection, contact period of 30 % minutes is required.

HANDWASHING:

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 health care settings.

HAI infection, 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. So, health care personnel need to follow proper hand washing technique for prevention of hospital infection.

According to Inglis, hand washing, preferably with a disinfectant preparation, before and after contact with a patient or their body fluids is probably the single most effective means of preventing transmission of microorganisms between hospital patients. Similarly, Singh and Rattan also mentioned that hand washing is the single most important procedure known to prevent nosocomial infection in hospital environment.

The need and importance of hand washing under the following conditions have been supported by controlled studies and adopted by CDC:

- Before all invasive procedures.
- Before caring of susceptible patients.
- Before and after touching wounds and invasive devices.
- After caring for infected patients.
- Between contact with patients in high risk areas.

Wet both hands before application of soap (liquid is preferable). Follow the technique below for 15 – 30 seconds ensuring that each step consists of at least three strokes backwards and forwards.

Step 1
Rub palm to palm

Step 2
Right palm over back of left hand and left palm over back of right hand

Step 3
Palm to palm, with bent and spread out fingers

Step 4
Backs of fingers to opposing palms with fingers interlocked

Step 5
Circular rubbing of left thumb in closed right hand and vice versa

Step 6
Circular rubbing, backwards and forwards with closed right hand fingertips in left palm and vice versa.

Finally, rinse and dry hands thoroughly

Special attention should be paid to fingertips, thumbs and other areas of hands likely to contact a contaminated site. Hands should be rinsed in clean water. Care should be taken to dry the skin with paper towels to avoid skin damage. If frequent washing has been performed hand cream should be applied at the end of duties to prevent skin desiccation and cracking.

STRATEGIES FOR PREVENTION OF HOSPITAL ACQUIRED INFECTION:

According to Mims28, the three main strategies for the prevention of hospital acquired infection are exclusion of source of infection, breaking the chain of infection and enhancing the host's ability to resist infection.

Exclusion of source of infection and breaking the chain of infection:

To exclude the source of infection, health care providers –

- Should avoid direct contact with patients, fomites especially body fluids.
- Should wear barriers such as gloves when contact is necessary.
- Should avoid puncturing oneself with any fluid –contaminated instruments.
- Frequent hand washing especially between patients.
- Careful handling, cleaning and disinfection of fomites.
- Should do possible use of single –use disposable items.
- Should do patient isolation for seriously infected patient.

Air flow system play an important role in the dissemination of organisms by airborne route. This can be reduced by isolating patients.

Enhancing host ability to resist infection:

Host resistance can be enhanced by boosting immunity and reducing risks factors

1) Boosting specific immunity-

- Passive immunization provides short term protection.
- Appropriate use of prophylactic antibodies prevents infection to an extent. But there is a tendency to misuse antibodies –by using them too often or for long, thereby increasing the selection pressure for the emergence of resistance organism.

2) By choosing inappropriate antimicrobial agents Care of invasive devices is essential to reduce the risk of endogenous infection from skin organisms and from catheters.

HAI RATES:-

CRBSI Rate = $\frac{\text{No of blood stream culture positive}}{\text{No. of Catheter related bed days}} \times 1000$

VAP Rate = $\frac{\text{No of ET tube suction culture positive}}{\text{No. of Ventilator bed days}} \times 1000$

UTI Rate = $\frac{\text{No of catheter tip culture positive}}{\text{No. of Catheter bed days}} \times 1000$

SSI Rate = $\frac{\text{No of surgical site culture positive}}{\text{total no of surgeries performed}} \times 1000$

WASTE MANAGEMENT SYSTEM :-

Ministry of Health and Family Welfare,(1998) recommended the following hospital waste management process. Segregation at the source and safe storage is the key to whole waste management process. It should be carried out at the point of generation to keep general waste from infectious waste. By segregation, a hospital can reduce total treatment cost, reduce the impact of waste on community and reduce the chance of infecting health care workers. Hospital managers may prefer to use plastic or metal bins for waste storage in order to save on the cost and paperwork of buying large number of one strip sacs. Treatment of waste is required to disinfect, or decontaminate by chemical disinfectants of waste at right source, so that there is no longer the source of pathogenic microorganisms. After treatment residue can be handled safely, transported, stored or disposed. Infectious waste needs to be destroyed or infected by recommended methods of disinfecting or destruction of biologically infected waste such as autoclaving and microwaving. Incineration is the better option for the large scale infectious waste management

DOCUMENTATION, EMPLOYEE HEALTH AND TRAINING

According to Bennett and Brachman30, personnel health service can contribute to infection control activities by establishing such policies and procedures as placement evaluations, health and safety education, immunization programmes monitoring potentially harmful infectious exposures and instituting appropriating preventive measures ,coordinating plans for managing outbreaks among healthcare workers providing information regarding infection risks related to employment and developing guidelines for restricting work because of infectious disease and maintaining health records of all HCW's .

As per Bennett and Brachman , health care providers have the duty to protect the health personnel as well as patients. Health care workers are exposed to a wide array of health and safety hazards including exposure to biologic agents, stress, injury and chemical agents. Immunization of the personnel is an important component of hospital control programs.

RESEARCH METHODOLOGY

This deals with the research methodology selected by the investigator in order to study physical facilities available for infection control, existing infection control procedures and to give the suggestive measures to improve infection control procedures in ICUs. Since ICU is a vast area and there are different types of Intensive Care Units in the hospital, the investigator has therefore taken (MICU) Medical Intensive Care Unit, (NICU) Neonatal Intensive Care Unit, (PICU) Pediatric Intensive Care Unit, (CCU) Coronary Care Unit for the study.

Study Design:-

The study will be non-experimental evidence based in nature. The study will be based on observation made. It will be done broadly in the 2 parts.

1. Present level of HAI in various ICUs.
2. Preventive measures on evidence based.

Data collection tools:-

The study is carried out in the intensive care units of, Heritage Hospital Lanka Varanasi. The required data is collected from hospital nursing staffs who works in Medical Intensive Care Units, Staff of microbiology lab through questionnaires, personal observation and studying relevant record or infection control maintained in medical intensive
Care units.

Study time:- Study time was of twelve weeks.

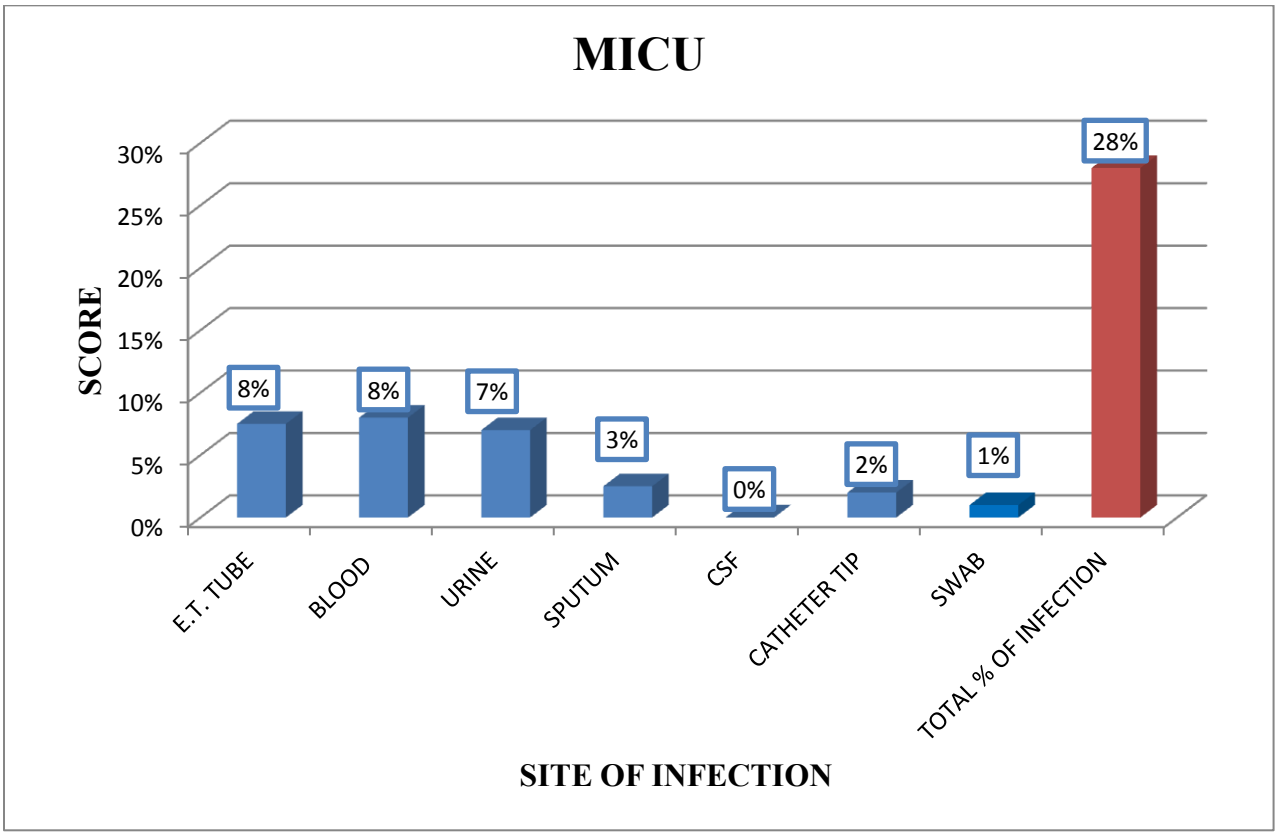
Study Methodology:-

The tools adopted for study is descriptive method and the required data is obtained from, personal observation and studying relevant record for infection control maintained in medical intensive care unit.

Study Data:-

Secondary data:- Records of ICU department and reports of microbiology lab.

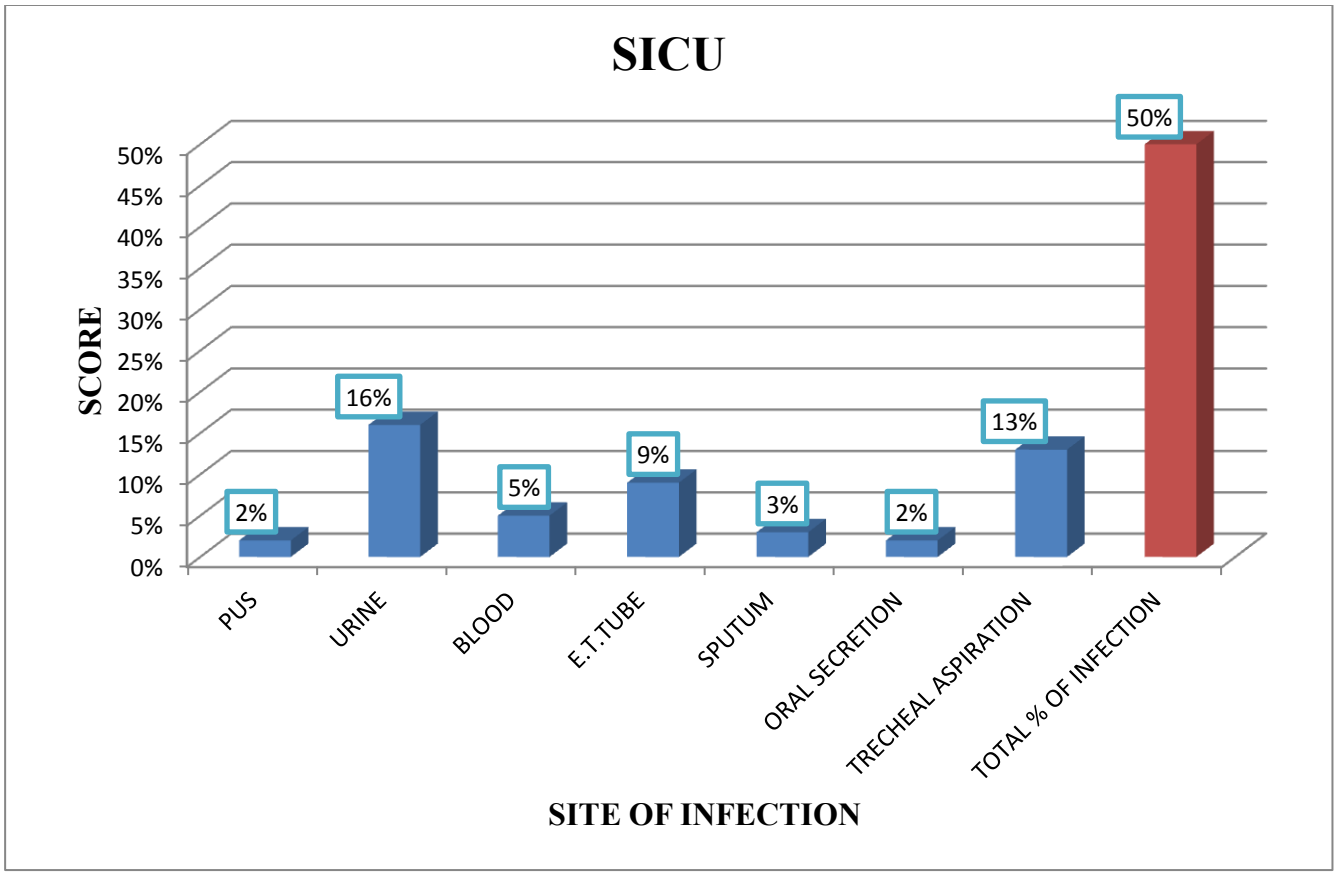
ANALYSIS OF DATA



INTERPRETATION

1. Total no. of patients taken from MICU (Medical ICU) is 170.
2. 28% patient's means 47 patients got Hospital Acquired Infection out of 170 admitted in MICU. It is a high rate of infection level.
3. 8% patients are found infected in the sample of E.T. Tube.
4. 8% patients are found infected in the sample of Blood after the use of central line catheter.

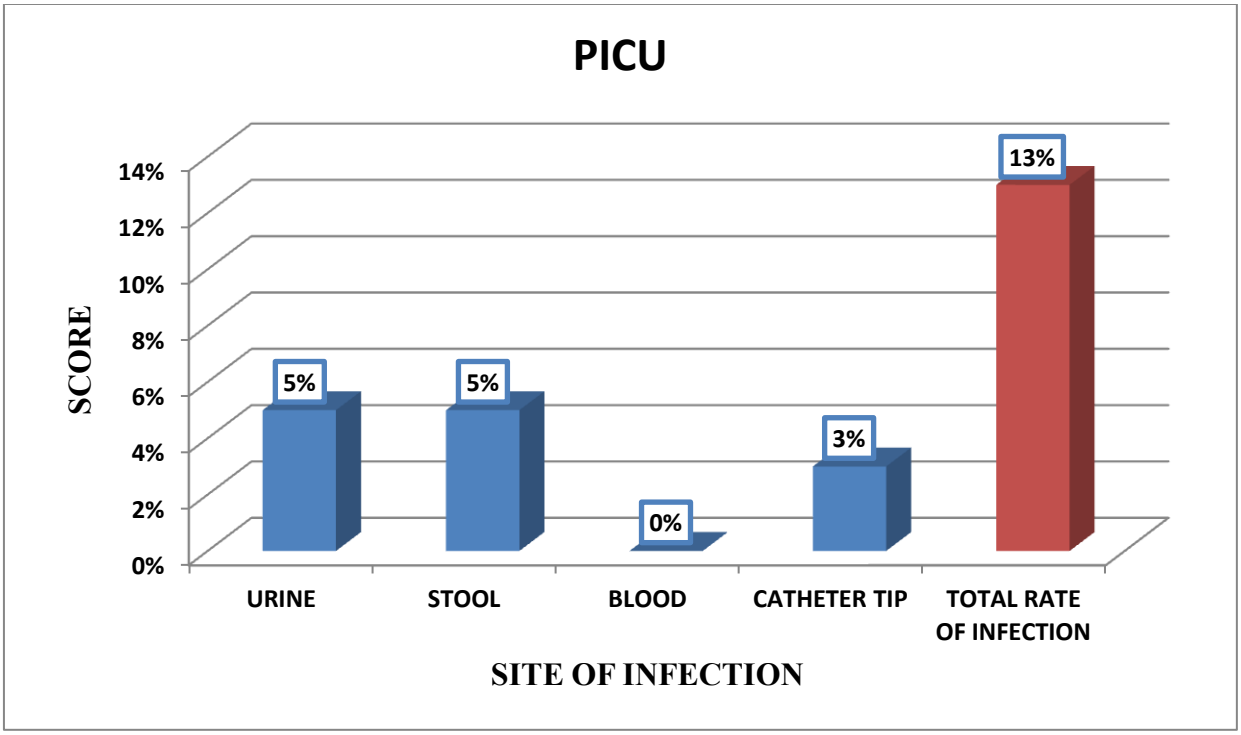
5. 7% patients are found infected in the sample of urine after the use of catheter. It is a matter of concern so root cause should be found out, analyzed and corrective and preventive action should be taken.
6. 3% patients are found infected in sputum sample.
7. There is no case found of CSF positive due to HAI.
8. 2% patients are found infected in catheter tip sample after the use of catheter.
9. 1% cases are found positive in swab culture.



INTERPRETATION

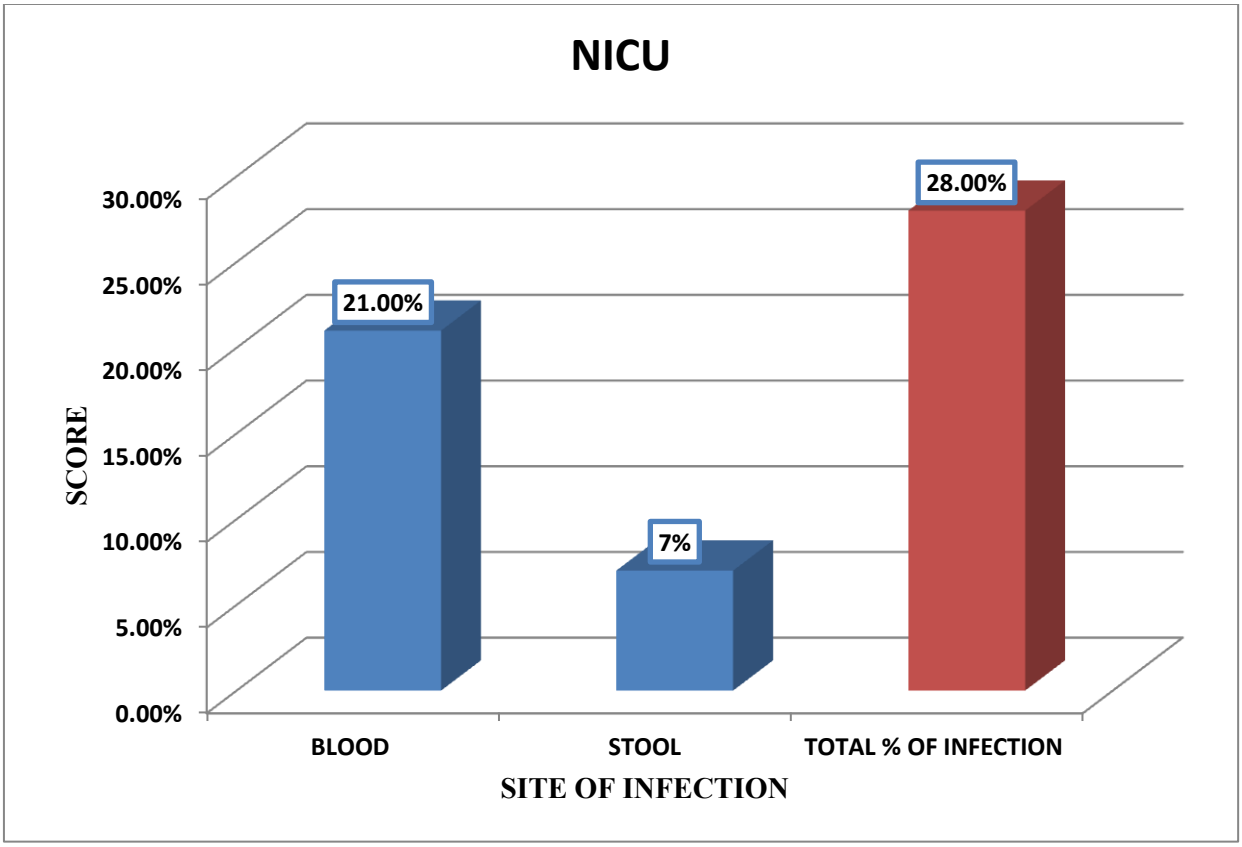
1. Total 48 patients are admitted in Surgical ICU (SICU).
2. Out of 48, 24 cases are found infected by HAI that is about 50%. It is a very high level of infection.
3. 2% patients are found infection positive in SICU in pus sample after surgery and it shows the surgical site infection.
4. 16% patients are found infection positive in urine tests after the use of catheter.
5. 5% patient's blood sample is found positive in SICU means catheter related blood stream infection is found.
6. 9% patients are found infection positive due to eno- tracheal tube intubations.
7. 3% patients are found sputum infection positive.
8. 2% patient's oral secretions are positive admitted after any surgical procedure in SICU.

9. 13% patients are positive for tracheal secretion culture in SICU.



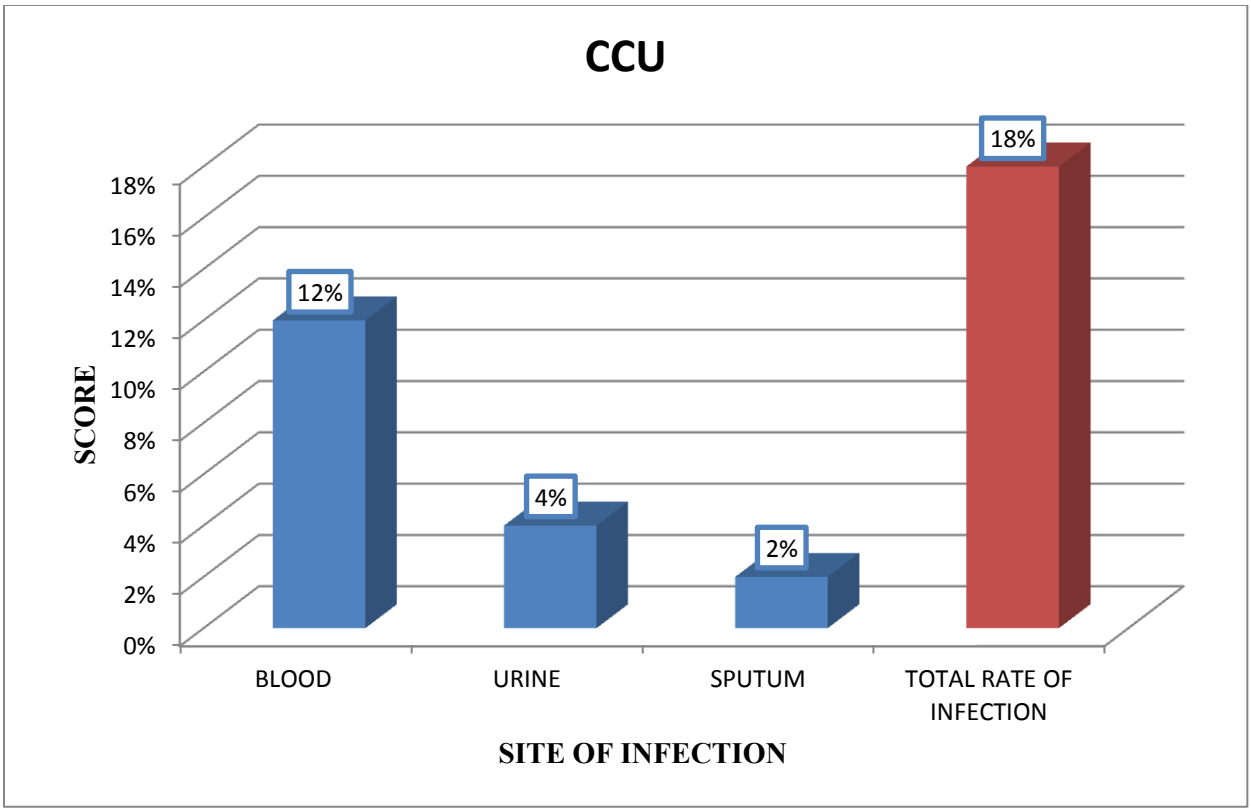
INTERPRETATION

1. 48 patients are admitted in PICU and HAI rate is found 13% , means 6 patients are infected that is a high rate of HAI.
2. 5% cases are found urine culture positive.
3. Blood infections are found 0% .
4. Stool samples are found 5% positive out of the patients admitted in PICU.
5. 3% cases are found catheter tip positive.



INTERPRETATION

1. 33 patients are admitted in NICU (Neonatal ICU) and 28% of that are infected means 9 patients got infected.
2. 21% patient's blood sample is found positive as HAI.
3. 7% cases are found stool sample positive as HAI.



INTERPRETATION

1. 30 patients are admitted in and 5 patients found positive in CCU that is 18%.
2. 12% cases blood sample are positive by HAI.
3. 4% urine samples are found positive.
4. 2% cases of sputum sample is positive.

Suggestions

- All patient, staff and visitors area of the organization should included in the infection control program.

- The hospital should provide barrier precautions and isolation procedures that protect patient, visitors, and staff from communicable diseases and protects immune suppressed patients from acquiring infections to which they are uniquely prone.

- Proper bio waste- collection process should be used by nurses and housekeeping staff of the hospital.

- Gloves, masks, eye protection, other protective equipments, soap and disinfectants are available and used correctly when required. Internationally acceptable hand hygiene guidelines are generated by World Health Organization (WHO) and the United States Center for disease control and prevention. These should be followed strictly.

- Proper body and hand hygiene should be followed by nursing and housekeeping staff of HAI as well as general IPD staff

- Proper personal protective equipments should be used by CSSD staff in the process of sterilization of equipments with proper storage and transferring facility.

- Proper facilities and adequate resources are provided to support the infection control programme. It includes hand washing facilities in all patient care areas and accessible to health care providers and compliance with proper hand washing is monitored regularly.

- Adequate gloves, masks, soaps and disinfectants are available and used correctly.

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Infection Control Checklist

Regulatory Questions	Yes	No	Comments
1. Does the facility have in place a system to monitor and investigate causes of infection and manner of spread?		No	
2. Does the facility maintain a separate record on infection that identifies each resident with an infection, states the date of infections, the causative agent, the origin or site of infection, and describes what precautionary measures were taken to prevent the spread of infection within facility?		No	
3. Does the system being used enable the facility to analyze clusters, changes in prevalent organisms, or increases in the rate of infection in a timely manner?		No	
4. Does the facility routinely review the surveillance data and are recommendations made for the prevention and control of additional cases?		No	
5. Is the written infection control policy periodically reviewed by the infection control committee or designated personnel with qualifications and revised as indicated?		No	
6. Does the facility have the definitions of infections in writing?	Yes		
7. Does the facility have a written		No	

protocol on the risk assessment of communicable diseases for both residents and staff and review annually or more frequently as needed?			
8. Does the facility have methods in place for identifying, documenting, and investigating facility-acquired infections and communicable diseases?		No	
9. Does the infection control program enable the facility to identify new infections quickly?		No	
10. Does the infection control program pay particular attention to residents of high risks of infections such as immobility, invasive devices, pressures sores, recently discharged from hospitals, mentally retarded or ill, decreased mental status, compromised nutritionally or immunologically?	Yes		
11. Does the facility have written protocols for early detection of residents who have signs or symptoms of infectious diseases and a referral protocol (internal or external) so that it can be evaluated and managed appropriately?		No	
12. Does the facility have written measures for prevention of infections especially those associated with IV therapy, indwelling catheters, tracheotomy care, stoma care, respiratory care, immunosuppression, pressure sores, bladder and bowel incontinence and other factors which compromise a resident's resistance to infection?		No	

13. Does the facility have written measures for communicable diseases, hepatitis A, B and C and AIDS?	Yes		
14. Does the facility have written procedures to inform and involve a local of State Authorities for non-sporadic, facility-wide infections that are difficult to control?	Yes		
15. Does the facility have isolation procedures and requirements for infected and at risk immunosuppressed patients?	Yes		
16. Does the facility have written measures for the use of Standard Precautions and documented in-service education for this standard?		No	
17. Does the facility have written protocols for hand washing, respiratory protection, linen handling, housekeeping practices, needle and hazardous waste disposal?	Yes		
18. Does the facility have in place needlestick prevention technologies to help comply with applicable regulations for making wise decisions on purchasing?		No	
19. Does the facility have in writing authority and indications for obtaining and acting upon microbiological cultures from patients and for isolating patients?		No	
20. Does the facility have in writing the proper use of disinfectants and antiseptics accordance with manufacturer's instructions and	Yes		

regulatory authorities label specifications to avoid harm to staff, residents and visitors in order to ensure their effectiveness?			
21. Does the facility have written documentation of orientation of all new facility personnel and periodic updates to the infection control program?		No	
22. Does the facility have written measures for the screening of the health care workers for communicable diseases and for the evaluation of workers exposed to residents with communicable diseases and blood borne pathogens?		No	
23. Does the facility have written guidelines for work restrictions for an employee that is infected or ill with a communicable disease?	Yes		
24. Does the facility have written measures which address the prevention of infections common to hospitals?		NO	
25. Does the facility have written measures for the sanitation of tubs, whirlpools and common use equipment performed according to manufacturer's direction?		No	
26. Does the facility isolate patients appropriately to prevent the spread of infections?	Yes		
27. Does the facility have written protocols for hand washing? Does it follow recommendation?	Yes		

28. Are hand washing facilities accessible to the health care workers?	Yes		
29. Are gloves accessible to the health care workers?	Yes		
30. Are proper glove sizes available to the health care worker?		No	
31. Are hypoallergenic gloves available to health care workers who need them?		No	
32. Does the facility isolate infected patients to the degree necessary to isolate the organism?	Yes		
33. Does the facility have written protocols on what type of diseases require droplet precautions?		No	
34. Does the facility prohibit employees with communicable diseases having direct contact with residents?	Yes		
35. Are employees aware of the facility's work restriction protocol?		Yes	
36. Does the facility have written protocols that require staff to wash their hands after each direct patient contact when indicated?	Yes		
37. Is soiled linen handled to contain and minimize aerosolization and exposure to any waste products?		No	
38. Is the soiled linen storage areas well ventilated and maintained under	Yes		

negative air pressure?			
39. Is the laundry designed to eliminate crossing of soiled and clean linen?	Yes		

Compliance staff: Date: _____

ANNEXURE

HAI DATA OF 2014

MICU		2014					

S.NO	PATIENT NAME	AGE	SEX	SAMPLE	ORGANISM GROWTH	NO GROWTH
1	SHARDA DEVI	65	F	E.T.TUBE	E.COLI	
2	DIWAKAR MISHRA	73	M	BLOOD	STAPHYLOCOCUS AUREUS	
3	BACHCHA PATHAK	83	M	URINE	NO	NG
4	KEHKASA AKHTAB	52	F	BLOOD	NO	NG
5	BANDANA MISHRA	35	F	BLOOD	NO	NG
6	DINESH KUMAR	36	M	BLOOD	NO	NG
7	MITHILESH DUBEY	22	M	URINE	NO	NG
8	GAURAV KUMAR	17	M	URINE	NO	NG
9	MITHILESH DUBEY	22	M	BLOOD	NO	NG
10	GAURAV KUMAR	17	M	BLOOD	NO	NG
11	MITHILESH DUBEY	22	M	BLOOD	NO	NG
12	CHANDRAMA DEVI	62	F	BLOOD	NO	NG
13	DHRUVIJI PRASAD	69	M	BLOOD	NO	NG
14	CHANDRAMA DEVI	62	F	SPUTUM	ACINETOBACTER BAUMANNIL	

15	AWADESH KUMAR	34	M	E.T TUBE	NO			NG	
16	BANDANA MISHRA	35	F	E.T TUBE	**PSEUDOMONAS**				
17	BANDANA MISHRA	35	F	E.T TUBE	**ACINETOBACTER BAUMANNIL**				
18	MITHILESH DUBEY	22	M	BLOOD	NO			NG	
19	RAMSHANKAR GUPTA	65	M	E.T TUBE	**CANDIDA**				
20	CHANDRAMA DEVI	62	F	BLOOD	NO			NG	
21	RENU SHARMA	40	F	BLOOD	NO			NG	
22	RENU SHARMA	40	F	BLOOD	NO			NG	
23	REETU	40	F	BLOOD	NO			NG	
24	REETU	40	F	URINE	NO			NG	
25	RENU SHARMA	40	F	URINE	NO			NG	
26	KAMESHWAR PRASAD	69	M	BLOOD	NO			NG	
27	KAMESHWAR PRASAD	69	M	URINE	**CANDIDA**				
28	REETU	40	F	BLOOD	NO			NG	
29	REETU	40	F	CSF	NO			NG	
30	NATHUNI SINGH	80	M	CATHETER TIP	**CANDIDA**				
31	LAKSHAN YADAV	35	M	URINE	NO			NG	
32	KAMESHWAR PRASAD	69	M	CATHETER TIP	**CANDIDA**				
33	RAM LALLA SINGH	72	M	URINE	NO				
34	MADHURI GUPTA	58	F	BLOOD	**E.COLI**				
35	CHANDRAMA DEVI	62	F	CATHETER TIP	**PSEUDOMONAS AERUGINOSA**				
36	NARESH SINGH	60	M	BLOOD	NO			NG	
37	S.P SRIVASTAV	74	M	BLOOD	NO			NG	
38	PHOOLA DEVI	60	F	BLOOD	**E.COLI**				
39	S.P SRIVASTAV	74	M	URINE	NO			NG	
40	S.P SRIVASTAV	74	M	URINE	NO			NG	
41	LUTAWAN RAM	71	M	E.T TUBE	**CANDIDA**				
42	BARMATI DEVI	62	F	URINE	**CANDIDA**				
43	KAMESHWAR PRASAD	69	M	URINE	NO			NG	
44	RAMDIN GURSARIYA	84	M	URINE	**CANDIDA**				
45	KAMESHWAR PRASAD	69	M	BLOOD	NO			NG	
46	RAMDIN GURSARIYA	84	M	BLOOD	NO			NG	
47	S.P SRIVASTAV	74	M	BLOOD	NO			NG	
48	KAMESHWAR PRASAD	69	M	BLOOD	NO			NG	

49	DAROGA SINGH	68	M	URINE	NO			NG	
50	NATHUNI SINGH	80	M	URINE	**PSEUDOMONAS**				
51	KAMESHWAR PRASAD	69	M	URINE	**ENTEROCOCCUS FACCIUM**				
52	KAMESHWAR PRASAD	69	M	BLOOD	**STAPHYLOCCUS HAEMOLYTICUS**				
53	KAMESHWAR PRASAD	69	M	CATHETER TIP	NO			NG	
54	KAMESHWAR PRASAD	69	M	BLOOD	**STAPHYLOCOCCUS**				
55	SAGHEER AHMED	62	M	BLOOD	NO			NG	
56	SAGHEER AHMED	62	M	URINE	NO			NG	
57	SAGHEER AHMED	62	M	E.T TUBE	**ACINETIBACTOR**				
58	KAMESHWAR PRASAD	69	M	BLOOD	NO			NG	
59	SAGHEER AHMED	62	M	BLOOD	NO			NG	
60	RAMDIN GURSARIYA	84	M	BLOOD	NO			NG	
61	ANITA JAISWAL	47	F	BLOOD	**PSEUDOMONAS**				
62	ANITA JAISWAL	47	F	CATHETER TIP	**BURKHOLDE CEPACIA**				
63	RAJESH SINGH	35	M	URINE	NO			NG	
64	DAROGA SINGH	68	M	E.T TUBE	**ACINETOBACTO**R				
65	SAGHEER AHMED	62	M	BLOOD	**CANDIDA**				
66	LUTAWAN RAM	71	M	URINE	NO			NG	
67	RAJESH SINGH	35	M	BLOOD	NO			NG	
68	LUTAWAN RAM	71	M	SPUTUM	**KLEBSIELLA**				
69	RAM PRASAD SINGH	42	M	URINE	NO			NG	
70	LUTAWAN RAM	71	M	BLOOD	**STAPHYLOCOCCUS**				
71	RAM PRASAD SINGH	42	M	BLOOD	NO			NG	
72	RAJ KUMAR SAIGAL	65	M	URINE	NO			NG	
73	RAM PRAVESH SINGH	42	M	BLOOD	NO			NG	
74	JAYANTI SINGH	65	F	BLOOD	NO			NG	
75	SUSHEELA DEVI	44	F	URINE	NO			NG	
76	MOHD KASIM	75	M	URINE	**E.COLI**				
77	RAJ KUMAR SAIGAL	65	M	BLOOD	**E.COLI**				
78	SUSHEELA DEVI	44	F	BLOOD	NO			NG	
79	SUSHEELA DEVI	44	F	URINE	NO			NG	
80	SUSHEELA DEVI	44	F	BLOOD	NO			NG	
81	CHANDRAMA DEVI	62	F	URINE	NO			NG	
82	SHASH NATH SINGH	54	M	URINE	NO			NG	
S	**SICU**			**2014**					

NO									
1	VIDYUT KUMAR CHATERJEE	58	M	PUS	E.COLI				
2	INDRAWATI DEVI	57	F	URINE	CANDIDA				
3	RAM SIRMAN YADAV	70	M	URINE	NO			NG	
4	INDRAWATI DEVI	57	F	BLOOD	NO			NG	
5	INDRAWATI DEVI	57	F	BLOOD	NO			NG	
6	RUDRA PRASAD SAHU	58	M	E.T TUBE	ENTEROBACTER				
7	R.K MISHRA	95	M	URINE	CANDIDA				
8	RAMAKANT LAL	82	M	SPUTUM	E-COLI				
9	RAMAKANT LAL	82	M	URINE	E-COLI				
10	R.K MISHRA	95	M	SPUTUM	KLEBSIELLA				
11	R.K MISHRA	95	M	URINE	ACINECTOBACTER				
12	R.K MISHRA	95	M	ORAL SECRETION	PSEUDOMONAS				
13	RAMCHANDRA TIWARI	66	M	URINE	NO			NG	
14	RAMAKANT LAL	82	M	URINE	NO				
15	RAM CHANDRA TIWARI	66	M	URINE	NO			NG	
16	DHRUVJI PRASAD	69	M	URINE	NO			NG	
17	RAM CHANDRA TIWARI	66	M	BLOOD	NO			NG	
18	RAMAKANT LAL	82	M	BLOOD	NO			NG	
19	DHRUVJI PRASAD	69	M	BLOOD	NO			NG	
20	NARENDRA NARAYAN SINGH	47	M	BLOOD	NO			NG	
21	RAMAKANT LAL	82	M	TRACHEAL ASPIR.	PSEUDOMONAS				
22	NARENDRA NARAYAN SINGH	47	M	BLOOD	NO			NG	
23	DHRUVJI PRASAD	69	M	BLOOD	NO			NG	
24	RAMAKANT LAL	82	M	BLOOD	NO			NG	
25	RAMAKANT TIWARI	66	M	BLOOD	NO			NG	
26	NARENDRA NARAYAN SINGH	47	M	URINE	NO			NG	
27	NARENDRA NARAYAN SINGH	47	M	URINE	NO			NG	
28	NARENDRA NARAYAN SINGH	47	M	TRACHEAL SECRETION	NO			NG	
29	NARENDRA NARAYAN SINGH	47	M	E.T TUBE	ACINECTOBACTER				
30	BHAGWATI PRASAD	75	M	TRACHEAL	E-COLI				

	TIWARI			SECRETION					
31	RAMAKANT LAL	82	M	BLOOD	NO			NG	
32	JANKI DEVI	55	F	E.T TUBE	**E-COLI**				
33	LOKNATH PANDEY	74	M	E.T TUBE	**CANDIDA**				
	PICU			**2014**					
1	ARYAN GUPTA	6	M	URINE	NO			NG	
2	PIYUSH AGRAWAL	2	M	BLOOD	NO			NG	
3	VIKAS KUMAR	12	M	BLOOD	NO			NG	
4	BABY OF JYOTI	1 MONTH	F	BLOOD	NO			NG	
5	VIKAS KUMAR	12	M	BLOOD	NO			NG	
6	PIYUSH AGRAWAL	2	M	BLOOD	NO			NG	
7	VIKAS KUMAR	12	M	URINE	NO			NG	
8	SHRUTI SRIVASTAV	10	F	URINE	NO			NG	
9	SHRUTI SRIVASTAV	10	F	BLOOD	NO			NG	
10	SHRUTI SRIVASTAV	10	F	BLOOD	NO			NG	
11	VIKAS KUMAR	12	M	BLOOD	NO			NG	
12	PIYUSH AGRAWAL	2	M	BLOOD	NO			NG	
13	ARNIKA	1	M	BLOOD	NO			NG	
14	PIYUSH AGRAWAL	2	M	URINE	NO			NG	
15	BABY OF ARNIKA	1	M	STOOL	NO			NG	
16	SHRUTI SRIVASTAV	10	F	BLOOD	NO			NG	
17	INDU KUMARI	8	F	BLOOD	NO			NG	
18	INDU KUMARI	8	F	BLOOD	NO			NG	
	NICU			**2014**					
1	BABY OF NEERU	8 MONTH	M	BLOOD	**ENTEROCOCUS FAECALLS**				
2	BABY OF JYOTI	I MONTH	F	BLOOD	NO			NG	
3	BABY OF PANKHURI	3 MONTH	F	URINE	NO			NG	
4	BABY OF JYOTI	1	F	BLOOD	NO			NG	

		MONTH							
5	BABY OF ARNIKA	1 YEAR	M	BLOOD	NO			NG	
6	BABY OF NEERU	20 DAYS	M	BLOOD	NO			NG	
7	BABY OF NEERU	20 DAYS	M	BLOOD	NO			NG	
8	BABY OF NEERU	20 DAYS	M	BLOOD	NO			NG	
9	BABY OF AMRITA SINGH	4 DAYS	F	BLOOD	NO			NG	
10	BABY OF AMRITA SINGH	4 DAYS	F	BLOOD	NO			NG	
11	BABY OF SHIVANI	3 DAYS	F	BLOOD	NO			NG	
12	BABY OF SHIVANI	6 DAYS	F	URINE	NO			NG	
	CCU			**2014**					
1		73	M	BLOOD	NO			NG	
2		73	M	URINE	NO			NG	
3		73	M	BLOOD	NO			NG	
4		73	M	BLOOD	NO			NG	
5		65	F	URINE	NO			NG	
6		70	M	URINE	**PSEUDOMONAS AERUGINOSA**				

RECORD	**MICU**		**2014**	**INFECTION CONTROL RECORD**

S.NO	**PATIENT NAME**	**AGE**	**SEX**	**SAMPLE**	**ORGANISUM GROWTH**	
1	MRS.JAYANTI SINGH	65	F	BLOOD	NO	
2	MR.TRILOCHAN SINGH	63	M	BLOOD	NO	
3	MR.TRILOCHAN SINGH	63	M	URINE	NO	
4	MR.DHRUVJI PRASAD	69	M	SPUTUM	**ACINETOBACTER BAUMANNII**	
5	MR.TRILOCHAN SINGH	63	M	BLOOD	NO	
6	MRS.GEETA RANI	80	F	BLOOD	NO	
7	MRS.GEETA RANI	80	F	BLOOD (LEFT)	NO	
8	MR.MOHD.ADIL	25	M	URINE	NO	

9	MRS.JAYANTI SINGH	65	F	E.T.TUBE	**KLEBSIELLA PNEUMONAE SSP PNEUMONIAE**		
10	MRS.CHANDRAMA DEVI	62	F	SPUTUM	**KLEBSIELLA PNEUMONAE SSP PNEUMONIAE**		
11	MR.KAMAL NATH SRIVATAVA	76	M	URINE	**CANDIDA SP** GROWN		
12	MR.KAMAL NATH SRIVATAVA	76	M	BLOOD	NO		
13	MR.KAMAL NATH SRIVATAVA	76	M	BLOOD(RIGHT)	NO		
14	MR.TRILOCHAN SINGH	63	M	BLOOD	NO		
15	MR.KAMAL NATH SRIVATAVA	76	M	BLOOD(RIGHT)	NO		
16	MR.KAMAL NATH SRIVATAVA	76	M	BLOOD	NO		
17	MRS.CHANDRAMA DEVI	62	F	E.T.TUBE	**KLEBSIELLA PNEUMONAE SSP PNEUMONIAE**		
18	MRS.JAMWANTI DEVI	62	F	BLOOD	NO		
19	MRS.CHANDRAMA DEVI	62	F	SWAB	**ESCHERICHIA COLI**		
20	MR.TRILOCHAN SINGH	63	M	E.T.TUBE	**ACINETOBACTER BAUMANNII**		
21	MR.JAMWANTI DEVI	62	F	URINE	**ENTEROCCUS FAECIUM**		
22	MR.SATYADEV SINGH	67	M	URINE	NO		
23	MR.SATYADEV SINGH	67	M	URINE	NO		
24	MR.GULAB CHAND	82	M	BLOOD	NO		
25	MR.GULAB CHAND	82	M	BLOOD	NO		
26	MR.SATYADEV SINGH	67	M	BLOOD	NO		
27	MR.SATYADEV SINGH	67	M	BLOOD	NO		
28	MRS.SANGEETA PATHAK	48	F	PUS	NO		
29	MRS.SANGEETA PATHAK	48	F	BLOOD	NO		
30	MR.GULAB CHAND	82	M	URINE	NO		
31	MRS.SUMAN DEVI	40	F	BLOOD	NO		
32	MR.RADHEY SHYAM DIXIT	73	M	URINE	NO		
33	MRS.JAMWANTI DEVI	62	F	BLOOD	NO		
34	MR.KAMAL NATH SRIVATAVA	76	M	BLOOD	NO		
35	MR.DEVENDRA TIWARI	28	M	BRONCHO ASPIRATION FOR AFB			
36	MRS.SUMAN DEVI	40	F	URINE	NO		
37	MRS.SUMAN DEVI	40	F	BLOOD	NO		
38	MR.SATYADEV SINGH	67	M	BLOOD	NO		

39	MR.KAMESHWAR PRASAD	69	M	BLOOD	**PROTEU MIRABILIS**	
40	MR.KAMESHWAR PRASAD	69	M	BLOOD	**KLEBSIELLA PNEUMONAE SSP PNEUMONIAE**	
41	MRS.VIMLA DEVI	54	F	BLOOD	NO	
42	MR.KAMESHWAR PRASAD	69	M	URINE	NO	
43	MRS.VIMLA DEVI	54	F	BLOOD	NO	
44	MRS.VIMLA DEVI	54	F	E.T.TUBE	**KLEBSIELLA PNEUMONAE**	
45	MRS. SUMAN DEVI	40	F	BLOOD	NO	
46	MR.RAJENDRA PRASAD JAISWAL	56	M	URINE	**CANDIDA SP GROWN**	
47	MR.MAHENDRA PRATAP SINGH	58	M	BLOOD	**ESCHERICHIA COLI**	
48	MR.MAHENDRA PRATAP SINGH	58	M	BLOOD	**ESCHERICHIA COLI**	
49	MR.SHAILESH YADAV	23	M	URINE	NO	
50	MR.SHAILESH YADAV	23	M	BLOOD	NO	
51	MR. MONIR AHMAD	82	M	URINE	NO	
52	MR.SHAILESH YADAV	23	M	SPUTUM	NO	
53	MRS.VIMLA DEVI	54	F	BLOOD	NO	
54	MR.SHAILESH YADAV	23	M	BLOOD	NO	
55	MR.MAHENDRA PRATAP SINGH	58	M	SPUTUM	**ESCHERICHIA COLI**	
56	MR.SUJEET GUPTA	24	M	URINE	NO	
57	MR.MONIR AHMAD	82	M	BLOOD	NO	
58	MRS.KAMANDALI DEVI	72	F	URINE	NO	
59	SHALINI SINGH	28	F	URINE	NO	
60	MRS.KAMANDALI DEVI	72	F	BLOOD	NO	
61	MR.MSTAFER KHAN	73	M	URINE	NO	
62	MR.RAMSHABD YADAV	62	M	BLOOD	NO	
63	MR.RAMDEV PANDEY	76	M	URINE	NO	
64	MR.DHANRAJ PRADHAN	75	M	CSF	NO	
65	MR.RAMSHABD YADAV	62	M	BLOOD	NO	
66	MRS.SHEELA DEVI	51	F	URINE	NO	
67	MR.SHES NATH SINGH YADAV	54	M	URINE	PSEODOMONAS AERUGINOSA	
68	MR.SHES NATH SINGH YADAV	54	M	BLOOD	NO	

69	MRS.RITU TIWARI	25	F	URINE	NO		
70	MR.RAMDEV PANDEY	76	M	BLOOD	NO		
71	MR.SHES NATH SINGH YADAV	54	M	BLOOD	NO		
72	MRS.LALITA DEVI	63	F	BLOOD(RIGHT)	NO		
73	MR.RAMESWAR PRASAD SINGH	77	M	URINE	NO		
74	MRS.SHEELA DEVI	51	F	URINE	NO		
75	MR.DHANRAJ PRADHAN	75	M	URINE	CANDIDA SP GROWN		
76	MRS.ANJU PANDEY	32	F	URINE	CANDIDA SP GROWN		
77	MR.RAMSHABD YADAV	62	M	BLOOD	NO		
78	MRS.LALITA DEVI	63	F	BLOOD(RIGHT)	NO		
79	MRS.LALITA DEVI	63	F	BLOOD(LEFT)	NO		
80	MRS.AMRITABAI SHARMA	74	F	URINE	NO		
81	MR M.D MUSTAFA KHAN	73	M	URINE	CANDIDA SP GROWN		
82	MRS.AMRITABAI SHARMA	74	F	URINE	NO		
83	MR S.N PRASAD	54	M	BLOOD	NO		
84	MR S.N PRASAD	54	M	BLOOD	NO		
83	MR.S.N PRASAD	54	M	E .T .TUBE	CANDIDA SP GROWN		
84	MR.B.NSRIVASTAVA	75	M	URINE			
85	MR.MUSTAFA KHAN	73	M	E.T.TUBE	KLEBSIELLA		

SICU **2014**

S.NO	PATIENT NAME	AGE	SEX	SAMPLE	ORGANISUM GROWTH		
1	LOKNATH PANDEY	74	M	URINE	NO		
2	LOKNATH PANDEY	74	M	BLOOD	NO		
3	LOKNATH PANDEY	74	M	E.T TUBE	**CANDIDA**		
4	BHAGWATI PRASAD TIWARI	75	M	URINE	**E-COLI**		
5	LOKNATH PANDEY	74	M	BLOOD	**STAPH**		
6	SRI RAM DUBEY	72	M	BLOOD	NO		
7	SRI RAM DUBEY	72	M	BLOOD	NO		
8	SRI RAM DUBEY	72	M	TRACHEAL ASPIR.	**E-COLI**		
9	LOKNATH PANDEY	74	M	E.T TUBE	**ACINOBACTER**		

10	SRI RAM DUBEY	72	M	URINE	**E-COLI**	
11	J.N SINGH	46	M	BLOOD	NO	
12	J.N SINGH	46	M	URINE	**SERRATIA PROTCAMACULANS**	
13	J.N SINGH	46	M	TRACHEAL ASPIR.	**KLEBSIELLA**	
14	J.N SINGH	46	M	BLOOD	NO	
15	SRI RAM DUBEY	72	M	BLOOD	NO	
16	J.N SINGH	46	M	BLOOD	NO	
17	LOKNATH PANDEY	74	M	URINE	NO	
18	NARAYAN DAS RASTOGI	78	M	URINE	NO	
19	NARAYAN DAS RASTOGI	78	M	TRACHIEAL	**STAYLOCOCCUS AUREUS**	
20	LOKNATH PANDEY	74	M	TRACHIEAL	**PROTEUS MIRABILIS**	
21	SUBEDAR PANDEY	80	M	URINE	**ENTEROCOCCUS FAECIUM**	
22	LOKNATH PANDEY	74	M	BLOOD	**STAPYLOCOCCUS HAEMOLYTICUS**	
23	NARAYAN DAS RASTOGI	78	M	URINE	**STAPHYLOCOCCUS EPIDERMIDES**	
24	MR.BAHGWATI PRASAD TIWARI	75	M	URINE	**PROTEUS MIRABILIS**	
25	MR.BAHGWATI PRASAD TIWARI	75	M	TRACHIAL SECRETION	**PROVIDENCIA STUARTIAL**	
26	MR.BAHGWATI PRASAD TIWARI	75	M	BLOOD	**PROTEUS MIRABILIS**	
27	MR.SUBEDAR PANDEY	80	M	BLOOD	NO	
28	RADHA RAMAN CHAUBEY	59	M	URINE	NO	
29	RADHA RAMAN CHAUBEY	59	M	TRACHEAL ASPIR.	NO	
30						

NICU			**2014**			
S.NO	**PATIENT NAME**	**AGE**	**SEX**	**SAMPLE**	**ORGANISUM GROWTH**	
1	BABY OFSHIVANI SRIVASTAVA	3 DAYS	F	BLOOD	NO	

2	BABY OF NISHA RAI	4 DAYS	M	BLOOD	NO	
3	BABY OF NISHA RAI	4 DAYS	M	BLOOD	NO	
4	BABY OF PRIYANKA PANDEY	26 DAYS	M	BLOOD	**ACINEBACTER LOWOFFII**	
5	BABY OF PRIYANKA PANDEY	27 DAYS	M	BLOOD	**STAPHYLOCOCCUS WARNERI**	
6	BABY OF LALIT GUPTA	I MONTH	M	BLOOD	NO	
7	BABY OF LALIT GUPTA	1 MONTH	M	BLOOD	**STAPHYLOCOCCUS WARNERI**	
8	BABY OF SHIVANI	19 DAYS	F	BLOOD	**STAPHYLOCOCCUS HAEMOLYTICUS**	
9	MASTER ATISHAY JAIN	8 MONTH	M	URINE	NO	
10	MASTER HAMMAD KHAN	4 MONTH	M	STOOL	**ESCHERICHIA COLI**	
11	MASTER ATISHAY JAIN	8 MONTH	M	BLOOD	**STAPHYLOCOCCUS EPIDERMIS**	
12	MASTER HAMMAD KHAN	4 MONTH	M	BLOOD	NO	
13	MASTER HAMMAD KHAN	4 MONTH	M	URINE	NO	
14	MASTER HAMMAD KHAN	4 MONTH	M	BLOOD	NO	
15	BABY OF PRIYANKA	1 MONTH	M	BLOOD	NO	
16	MASTER HAMMAD KHAN	4 MONTH	M	BLOOD	**COAGULASC NEGATIVE STAPHYLOCOCCUS**	
17	ATISHA JAIN	8 MONTH	M	STOOL	**E-COLI**	
18	BABY OF SAROJ	6 MONTH	M	BLOOD	NO	
19	BABY OF SAROJ	6 MONTH	M	STOOL	E-COLI	
20	BABY OF PANKHURI	4 MONTH	F	STOOL	NO	
21	BABY OF KANHA	1 MONTH	M	BLOOD	STAPHYLOCOCUS	

PICU **2014**

S.NO	PATIENT NAME	AGE	SEX	SAMPLE	ORGANISUM GROWTH	
1	BABY SHARMIN	6 MONTH	F	BLOOD	NO	
2	BABY SHARMIN	6 MONTH	F	BLOOD	NO	
3	BABY SHARMIN	6 MONTH	F	STOOL	NO	
4	SAKSHI YADAV	6 YEAR	F	BLOOD	NO	
5	BABY GIRL SAKSHI DEVI	6 YEAR	F	BLOOD	NO	

6	BABY GIRL RIMI	2 YEAR	F	BLOOD	NO		
7	BABY GIRL	2 YEAR	F	STOOL	NO		
8	BABY GIRL RIMI	2 YEAR	F	BLOOD	NO		
9	BABY GIRL RIMI	2 YEAR	F	URINE	**ENTEROCCOS FAECIUM**		
10	MASTER PRATAP	1 YEAR	M	BLOOD	NO		
11	BABY RIMI	2 YEAR	F	BLOOD	NO		
12	MASTER PRATAP	1 YEAR	M	BLOOD	NO		
13	BABY SAKSHI YADAV	6 YEAR	F	CATHETER TIP	E.COLI		
14	BABY JANVI KUMARI	5 YEAR	F	BLOOD	NO		
15	MASTER PRATAP	I YEAR	M	BLOOD	NO		
16	BABY JANVI KUMARI	5 YEAR	F	BLOOD	NO		
17	GYAN PRSAD	11 YEAR	M	STOOL	E-COLI		
18	ASHISH	12 YEAR	M	STOOL	NO		
19	MASTER VIVAN	7 MONTH	M	BLOOD	NO		
20	MASTER ASHISH	12 YEAR	M	BLOOD	NO		
21	MASTER ASHISH	12 YEAR	M	URINE	NO		
22	MASTER VIVAN	7 MONTH	M	BLOOD	NO		
23	ASHISH	12 YEAR	M	BLOOD	NO		
24	MASTER VIVAN	7 MONTH	M	STOOL	STREPTOCOCCUS MUTAN GROWN		
25	BABY ASHISH	12 YEAR	M	BLOOD	NO		
26	BABY VIVAN	7 MONTH	M	BLOOD	NO		
27	SAKSHI YADAV	6 YEAR	F	URINE	ACCINOBACTER		
28	BABY VIVAN	7 MONTH	M	STOOL	ACCINOBACTER		
29	BABY RIMI	2 YEAR	F	URINE	KLEBSIELLA		
30	BABY ASHISH	12 YEAR	M	TIP FOYS CATHETER	PSEUDOMONAS		

CCU **2014**

S.NO	PATIENT NAME	AGE	SEX	SAMPLE	ORGANISUM GROWTH		
1	GEETA RANI	80	F	BLOOD	NO		
2	GEETA RANI	80	F	BLOOD	NO		
3	GEETA RANI	80	F	URINE	**CANDIDA**		
4	KAMAL NATH SRIVASTAV	76	M	SPUTUM	**E-COLI**		
5	JAMWANTI DEVI	62	F	BLOOD	NO		
6	VINAY KUMAR	62	M	BLOOD	NO		
7	SRI NATH SINGH	56	M	BLOOD	NO		
8	MR.IQBAL AHMED SHASTRI	74	M	BLOOD	NO		

9	MR.IQBAL AHMED SHASTRI	74	M	URINE	**ESCHERICHIA COLI**		
10	MR.SRINATH SINGH	56	M	BLOOD	NO		
11	MR IQBAL AHMAD SHASTRI	74	M	BLOOD	NO		
12	MRS.DEEPA PANDEY	51	F	URINE	NO		
13	MR.IQBAL AHMED SHASTRI	74	M	BLOOD	NO		
14	MR.MONIR AHMAD	82	M	BLOOD	NO		
15	MRS.SITARA BIBI	65	F	BLOOD	NO		
16	MR.MONIR AHMAD	82	M	BLOOD	**STAPHYLOCOCCUS HAEMOLYTICUS**		
17	MRS.SITARA BIBI	65	F	URINE	NO		
18	MRS.SITARA BIBI	65	F	BLOOD	NO		
19	MR.MONIR AHMAD	82	M	BLOOD (RIGHT)	NO		
20	MR.RAMDEO PANDEY	76	M	BLOOD	NO		
21	MR.PRAMOD KHANNA	60	M	BLOOD	NO		
22	MR.PRAMOD KHANNA	60	M	BLOOD	CANDIDA		
23	MR.BHARAT SINGH	74	M	URINE	NO		
24	MRS.SHAKUNTALA DEVI	53	F	BLOOD	NO		