INTERNSHIP TRAINING

AT

LAL BAHADUR SHASTRI HOSPITAL, MAYUR VIHAR, DELHI

"TO STUDY THE INFECTION CONTROL IN INTENSIVE CARE UNIT AT THE LAL BAHADUR SHASTRI HOSPITAL, MAYUR VIHAR, DELHI"

BY

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DR. SANJIV KUMAR, DIRECTOR IIHMR, DELHI

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH

NEW DELHI

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The certificate is awarded to

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in recognition of having successfully completed his
Internship in the department of

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Lal Bahadur Shastri Hospital, Khichripur, Delhi

and has successfully completed his Project on

To Study the Infection Control in Intensive Care Unit at

Lal Bahadur Shastri Hospital, Khichripur, Delhi

30 April 2018

Under the aegis of

National Institute of Health and Family Welfare, New Delhi

He comes across as a committed, sincere & diligent person
who has a strong drive & zeal for learning

We wish him all the best for future endeavours

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

The Internship is in fulfilment of the course requirements.

I wish him all success in all his future endeavours

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CERTIFICATE OF APPROVAL

The following dissertation titled "Infection Control in Intensive Care Unit" at Lal Bahadur Shastri Hospital, Mayur Vihar, Delhi is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of Post Graduate Diploma in Health and Hospital Management for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

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This is to certify that **Brig Nikesh Nandan ,** a graduate student of the **Post- Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. He is submitting this dissertation titled "**To Assess the infection control in Intensive Care Unit at Lal Bahadur Shastri Hospital, Khichripur, Delhi**" under the aegis of "**National Institute of Health and Family Welfare, New Delhi**" in partial fulfillment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management.**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled To Study the Infection Control Intensive Care Unit at the Lal Bahadur Shastri Hospital, Mayur Vihar, Delhi and submitted by Brig Nikesh Nandan Enrollment No PG/16/030 under the supervision of Dr. Sanjiv Kumar, Director IIHMR, Delhi for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from 01 Feb 2018 to 30 Apr 2018 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.

Nikesh Brig

Signature

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Brig Nikesh Nandan

INDEX

INTRODUCTION TO LAL BAHADUR SHASTRI HOSPITAL

Lal Bahadur Shastri Hospital is a secondary level multi-specialty hospital with 100 sanctioned beds (functional 188 beds). It is situated at Khichripur, in Trans Yamuna area of Delhi. It caters to East District of Delhi. It was commissioned in December, 1991 with OPD services only. Indoor services commenced w.e.f. 11.10.1996 and the Hospital became fully functional w.e.f. 22.06.1999. All the health services are provided FREE OF COST. Hospital campus is spread over 10.11 acres of land and has a floor area of 18,110 Sq. Mtrs. The Hospital caters to whole of East District of Delhi with more than 15 lacs population, other Trans Yamuna in Delhi, adjoining areas from NOIDA, Ghaziabad, Khora and other areas of Uttar Pradesh and other adjoining states. It has the following features:-

(a) ICU with six beds started w.e.f. 23.09.2009.
(b) Blood Bank started w.e.f. 01.10.2010.
(c) Hospital campus is spread over 10.11 acres of land and has a floor area of 18,110 Sq. Mtrs.
(d) Hospital has an additional vacant plot of 7,700 Sq. Mtrs. (approximately 2 acres).
(e) Average Bed Occupancy of the Hospital is 200% Services Being Provided: Outdoor Services in the following departments:
(a) Medicine.
(b) Surgery.
(c) Pediatric with New Born Nursery.
(d) Obs & Gyane.
(e) Ortho with Physiotherapy.
(f) Eye.
(g) ENT.
(h) Dental.
(j) Skin with PPTC and VCTC clinic.
(k) Psychiatry.
(l) ART Clinic.

Vision Statement: Service with Smile. The Vision of the Hospital is to provide best possible Quality Health Services in all the specialties in a harmonious atmosphere to every section of the society specially the under privileged through this 100 bedded multi-specialty hospital.

Responsibility

It is the responsibility of the hospital to provide quality medical service along with the basic amenities to include respect the rights of the patients, clean and hygienic environment, portable water, clean toilets, comfortable seating arrangements, adequate illumination, proper signage system etc.

OPD and IPD

Average daily OPD of the hospital ranges from 2500 to 3000 patients per day. The hospital was initally commissioned in 1991 to cater for only 500 OPD patients, which has gradually risen tremendously over the years. IPD admissions in the year 2015-16 were more than three lacs, out of which forty two thousand needed surgery. Total casualty footfall ranges from 700 to 800 patients on a daily basis.

Intensive Care Unit

LBSH is a 100 bedded hospital and as per norms is supposed to have only a LEVEL-1, ICU, but due to acute shortage of ICU beds in most tertiary care hospitals, very often the hospital has to manage patients with multiple organ failure i.e. highest level of care and in most of the cases success in achieved in saving the patient. The mortality rate in the ICU at LBSH is comparable to the best ICU, in the country. As an analysis the followign date of ICU is available for year 2015-16 : -

a. Transfer – In : 611
b. Transfer – out : 367
c. Discharge : 28
d. LAMA : 15
e. Transfer to other hospitals : 26
f. Deaths : 174

Major areas of concern in management of the ICU at LBSH is that they donot have dialysis facility in the hospital and the absence of Cardiology and Neurology department.

SNCU

12 Bedded SNCU was started on 01 Nov, 2015 and is fully functional. The SNCU is fully equipped with all modern advanced facilities like neonatal ventilators, Servo controlled radiant heat warmers, syringe – infusion pumps and multipara vital sign monitors. The salvagability rate is above 60% for E.L.B.W (less than one kg neonate). Screening of R.O.P. is done for premature babies in the hospital.

Abstract

Hospital is the place for cure" - this comes to our mind when we think about the hospital Treating the patients under same roof was considered as a revolutionary idea, and was expected that it will ease the job of healing. Intensive Care Unit (ICU) is one of the important aspects of critical care medicine. It includes resuscitation, emergency care for life threatening conditions, and intensive nursing care.. Due to high dependency of ICU patients and their critical conditions there are increased chances of getting hospital acquired infections among these patients. Nosocomial infections occur worldwide and affect both developed and resource-poor countries. Infections acquired in health care settings are among the major causes of death and increased morbidity among hospitalized patients. They are a significant burden for the patient and for public health as well as to health care personnel.

The study was focused to find out the physical facilities and control measures available for infection control (ICU).

The main objectives of the study to study the physical facilities available for infection control in intensive care unit and also the existing infection control procedures used in the intensive care unit. The research approach adopted in the study was a descriptive method. It includes collection of information regarding infection control procedures and its measures and also existing physical facilities available for infection control through questionnaires, studying relevant record maintained in ICU.

There were following majors findings during the study conducted in LBSH.

CLEANING, DISINFECTION AND STERILIZATION: The study revealed that surfaces in ICU are wet cleaned daily and walls are wet cleaned monthly. ICU tables and trolleys are wet cleaned daily. Fumigation is done weekly. Cleaning of air filters of air conditioners are done monthly as per nurses and doctors. Sterilizing efficiency of autoclave is monitored weekly or daily as per most of the respondents.

PREPARATION OF ICU: It is found from the study that according to majority of respondents, there is adequate hand washing facility which is easily accessible to health care providers but no appropriate technique is followed regarding hand washing.

SAFETY MEASURES AND PRECAUTION: The study revealed that according to sixty six(66) percent respondents amongst nurses and doctors (N=105), the level of safety measures is satisfactory; eighty two (82%) percent nurses and doctors always do double gloving while dealing with the patient. Sixty three percent nurses/doctors (N=105) take precautions after needle-stick injury only in case of infected patient. Sixty (60%) percent of respondents (N=105) decontaminate the hand first and then remove apron before leaving working area.

WASTE MANAGEMENT SYSTEM: The study revealed that health care waste generated in ICU is collected once daily. Waste is categorized while being collected. They use gloves and masks while handling waste. Majority of staff responded that all the waste generated is collected in bins with lid. Majority of staff (nurses/doctors, housekeeping) responded that the infected waste is not disinfected before disposal.

EMPLOYEE HEALTH AND TRAINING: The study revealed that 90 out of 150 respondents (nurses, doctors, housekeeping) have undergone formal training of hospital acquired infection control. Thirty six (36%) percent have undergone periodic health check-up and 52 respondents have received immunization relevant to their work. Result show that current physical facilities available for infection control are satisfactory. Strict adherence to standard infection control procedures need to be given under consideration and existing infection control measures in ICU needs improvement and up-gradation .

List of Abbreviations

AAC Access, assessment and Continuity of care

COP Care of Patient

CQI Continuous Quality Improvement

FMS Facility of Management and Safety

HAI Hospital Acquired infection

HIC Hospital Infection Control

HRM Human Resource Management

IC Infection Control

IMS Information Management System

ICU Intensive Care unit

MOM Management of Medication

NABH National accredation board for hospital &health care providers

PRE Patient Right and Education

ROM Responsibility of Management

PMT Project Management Techniques

PART-I

INTERN

REPORT

ROLES AND RESPONSIBILITIES DURING INTERNSHIP

During my internship period in LBSH, I worked as Operations Manager.

Till now I have actively participated in various activities which include:

- Designing of Policy Guidelines for setting up a new hospital- e.g. HR policy making.
- Training of the Nursing Staff.
- Literature review of the hospital
- Hospital Operations
- Claim Processing.

Routine/ General management

Handling of the operations in the areas assigned to me and was responsible for the smooth functioning of operations in the hospital.

In-depth study of the following fields:

- Operations
- Multi Super Speciality
- Claim processing

Learning during Dissertation

- Understand the various aspects involved in starting a new hospital and various challenges associated with it.
- Enhance my managerial skills.
- To understand working of whole hospital and seek opportunity that provides me real experience.
- Coordination within various departments of the hospital.

PART-II

DISSERTATION REPORT

INFECTION CONTROL

IN INTENSIVE CARE UNIT

LBSH

CHAPTER ONE- INTRODUCTION

1.1 Background

"Hospital is the place for cure" - this comes to our mind when we think about the 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 turned wrong in Pre-Listerian era because of lack of knowledge on sterilization and antisepsis. Gangrene and death were almost mandatory for the patients suffering from wounds. This lead into development of new discipline called as senics 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

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.

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.

In 1861,Semmelwisl 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 handwashing 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 is 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.

Hence, 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 well being 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.

Intensive Care Unit (ICU) is one of the important aspects of critical care medicine. It includes resuscitation, emergency care for life threatening conditions, and intensive nursing care.

- Patient may acquire infection before admission to the hospital = Community acquired infection.

- Patient may get infected inside the hospital = Nosocomial infection.
- It includes infections not present nor incubating at admission, infections that appear more than 48 hours after admission, those acquired in the hospital but appear after discharge also occupational infections among staff.

1.2 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 micro organisms including spores.

1.3 RATIONALE OF THE STUDY

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.

So, 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.

People at Risk

Everyone but nurses, doctors and housekeeping staff are more prone. If infection control is not taken seriously in ICU, then the incidence of nosocomial infections will continue to rise. Infection control is considered to be serious affair in patient and employee safety measures.

1.4 SCOPE OF THE STUDY

After conduction of research study and analysis of infection control in ICU, action plan/recommendations will be given which needs to be implemented in order to control the infection control in Intensive Care Unit in the appropriate manner and to fulfill the quality hygiene in ICU.

1.5 AIM & OBJECTIVES

AIM

This project intended to assess the infection control protocols in the Intensive Care Unit at LBSH, New Delhi.

OBJECTIVES

1. To study the physical facilities available for infection control in the intensive care unit.
2. To study the existing infection control procedures used in the intensive care unit.

1.6 REVIEW OF LITERATURE

Hospital Acquired Infection:

The term hospital acquired infection, hospital- associated infection, hospital infection or nosocomial infection(nosocomio,meaning hospital) 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.

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

Classification of Hospital Acquired Infection : In the words of Slack hospital acquired infection classified as:
(a) Infection contracted and developing outside the hospitals and require admission to the hospital (e.g. pneumococcal pneumonia),
(b) Infections contracted outside, but clinically apparent when the patient is in the hospital (e.g. chickenpox or zoster)
(c) Infections contracted, and developing when the patient is in hospital (e.g. device-associated bacteraemias),
(d) Infections contracted within the hospital, but not becoming clinically apparent until after the patient has been discharged (e.g. many postoperative wound infection)
(e) Infections contracted by hospital staff as a consequence of their work, whether or not this involves direct contact with patients (e.g. hepatitis B)

Sources of Hospital Inquired Infection:

According to Gupte, sources of hospital acquired infection are infecting micro organisms from fellow patients which may be multi drug resistant, infecting organisms from hospital staff, infecting organisms from instrument, blood products, intravenous fluid, from patient's normal flora, etc, insects are also source multidrug infection, organism may be present in air, dust, water, antiseptic solution, food, surfaces contaminated by patient's secretions, blood fluid, etc. (Reference Gupte S, Shortbook of Medical Microbiology, 2006)

Predisposing Factors of Hospital Inquired Infection:

As per Bhatia and collegues, predisposing factors for hospital acquired infection are hospital environment heavily laden with a variety of pathogens, organisms present in air, dust, antiseptic location, water and food or may be spread from sheddings from the

patients, hospital microbial flora is usually multi-drug resistant, patients have impaired defense mechanism due to disease therapy and investigations in the hospital, instrumentation hospitals may introduce infection, blood, blood products and IVfluids may transmit many infections and accidental inoculation of infectious material.

Mode of Transmission:

In the words of Nagoba, hospital acquired infection spreads by various routes as follows:

Contact: Main route of transmission. Transmitted by hands or clothing of hospital personnel and even patient himself or transmitted by contact with inanimate objects.

Air- borne route: Transmitted by inhalation of droplet, dust from bedding floors, exudates dispersed from wounds, skin, etc, and aerosols produced by nebulizers, Humidifiers and air conditioning apparatus

Oral Route: Transmitted by ingestion of contaminated food or water

Parenteral route: Transmitted by the use of contaminated syringes, needles and other instruments, by administration of contaminated blood, blood products, infusion fluids or tissue .

Innoculation Route: Infection by innoculation occurs when infected material is inoculated directly into tissue as in hepatitis B virus infection, virus is inoculated by transfusion of contaminated blood or inoculation of material containing the virus latrogenic transfer: Infections may also occur during diagnostic or therapeutic procedures, if proper care is not taken

Infecting Organisms:

According to Pai few decades ago common microorganisms was Staphylococcus aureus. Over the years the pattern has changed. At present the infecting micro organisms are pathogenic Escherechia coli, Pseudomonas aeruginosa, Staphylococcus aureus, streptococcus faecalis, Klebsiella, Proteus .Other organisms may be found less

commonly are methicillin resistant Staphylococcus aureus, clostridia which may cause gas gangrene, tetanus, candidiasis may cause pneumonia, meningitis and gastro enteritis, pneumocystic carinii may cause pneumonia ,hepatitis B or C virus which may hepatitis after 6 to 8 weeks, HIV infection may manifest late and tuberculosis may manifest late.

Common Hospital Inquired Infection:

Chakraborty enlisted common hospital acquired infection as given below:

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. (Reference Kalsi J, et al, Int J Uin Pract, 2003)

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 Staphy loco ecus 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) (Reference Wikipedia)

Gastrointestinal infection: e.g.. food poisoning , Salmonella infection Studies and incidence conducted on Hospital Inquired 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 nosocomial infection prevalence rate in ICU was 20.6 % TCU patients are particularly at risk from nosocomial infections as a result of mechanical ventilation, use of invasive procedures and their immunocompromised status. (Reference Vincent JL, et al, JAMA, 1995)

According to Rosenthal and his colleagues, nosocomial infections are an important public health problem in the developing countries, particularly in the intensive care unit (ICU) setting. They performed a prospective nosocomial infection surveillance study during the first year of an infection control program in six Argentinean ICUs. (Reference Rosenthal VD, Device Associated nasocomial infection rates in ICU of Argentina, June 2006). Nosocomial infections were identified using the Centers for Disease Control and Prevention National Nosocomial Infections Surveillance System definitions, and site-specific nosocomial infections rates were calculated.

The rate of catheter-associated blood stream 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 was45.3 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 on going targeted surveillance and implementation of proven infection control strategies is needed in developing countries such as Argentina. (Reference Rosenthal VD, Device Associated nasocomial infection rates in ICU of Argentina, June 2006).

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, Escherichia 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.

Reservoirs and Transmission

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

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.

2. Flora from another patient or member of staff

(Exogenous Cross-Infection). Bacteria are transmitted between patients: (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 staffs hands, visitors or other environmental sources (e.g. water, other fluids, food).

3. Flora from the health care environment (Endemic or epidemic exogenous environmental infections). Several types of micro organisms 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 10 m in diameter remain in the air for several hours and can be inhaled in the same way as fine dust).

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.

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 these programmes.

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 programme 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 programme for hospital personnel.

(Reference practical guidelines for Infection Control in Health Care Facility, SEARO Regional publication no. 41)

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 programme is to establish an infection control committee.

According to Weinstein (Reference Nasocomial Infections update, Weinstein.pdf March 2006) physician can contribute to infection control efforts by acting as role models for other personnel by paying careful attention to handhygiene 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

perioperative 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 infectionpredisposing 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 focussed on adherence to standard precaution at all times.

Sleigh and Timbury mentioned mat 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.

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

Nayak and Kulkami depicts that 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. Nosocomial 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 handwashing technique for prevention of hospital infection.

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 Brachman SO, 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.

CHAPTER TWO

RESEARCH METHODOLOGY

2.1 Source of data

The study is carried out in the intensive care unit, LBSH, New Delhi. The required data is collected from nurses, doctors, housekeeping staff who work in intensive care unit.

2.2 Study Design

The tools adopted for study is descriptive method where data was collected through questionnaires, interviews and personal observations.

2.3 Method of data collection

The required data is primary in nature collected through questionnaires, interviews, personal observation and studying relevant record for infection control maintained in intensive care unit.

2.4 Sample Size

The data is obtained from 150 respondents, consisting of nurses, doctors, housekeeping staff who work in the intensive care unit and other departments also. Total number of respondents (N) = 150. The figure of 150 respondents was primarily kept to have adequate sample size to come to logical deductions and convinience as per time available.

S.NO.	TYPES OF RESPONDENTS	NUMBER
1.	Doctors and Nurses	105
2.	Housekeeping	25
3.	Management	20

Management respondent primarily included in charges of ICU, OT, outsource services, kitchen, Grievances etc.

2.5 Duration of the study

9th February 2018 to 30 April 2018

2.6 Application of Tools During Research

As stated in para 2.2 above, the tools adopted for study were questionnaires, interviews and personal observations. Questionnaires were primarily used for getting responses of doctors and nurses and management staff. Interview based on questionannires were done of the housekeeping staff, while separate interviews were done for the management and doctor and nurses. Personal observations was done by the researcher primarily to observe whether the correct procedures and practices are being adopted to prevent Infection Control in Intensive Care Unit at Lal Bahadur Shastri Hospital, Mayur Vihar.

CHAPTER THREE

RESULTS AND FINDINGS

3.1 KEY OBSERVATIONS

S.NO.	PROCEDURE	OBSERVATION
1.	There is standard opening manual for ICU	NO
2.	Culture studies of swabs from ICU floor done	YES
3.	Bacteriological testing of water is done	YES
4.	Bacteriological testing of air is done	NO
5.	Antibiotic policy	NO
6.	Any protocol for wearing gloves	NO

3.2 RESULTS AND FINDINGS

3.2.1 FREQUENCY OF WET CLEANING IN ICU FOR TOTAL RESPONDENTS (N=150)

WET CLEANING	DAILY		WEEKLY		MONTHLY	
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
SURFACE	150	100				
WALLS			36	24	114	76
ICU TABLE	150	100				
TROLLEY	150	100				

In the study, it was found that hundred percent responders said that surface of ICU, table and Trolleys are been wet cleaned daily. Further analysis revealed that twenty four percent responded that walls are wet cleaned weekly while seventy six percent responded that walls are cleaned on monthly basis and not regularly.

FOR NURSES AND DOCTORS (N=105)

WET CLEANING	DAILY		WEEKLY		MONTHLY	
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
SURFACE	105	100				
WALLS			36	24	114	76
ICU TABLE	105	100				
TROLLEY	105	100				

Almost 100 percent nurses and doctors believed that ICU surface, tables and trolleys are cleaned daily though 76 percent said that walls are not cleaned regularly.

FOR HOUSEKEEPING (N=25)

WET CLEANING	DAILY		WEEKLY		MONTHLY	
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
SURFACE	25	100				
WALLS			19	75	6	25
ICU TABLE	25	100				
TROLLEY	25	100				

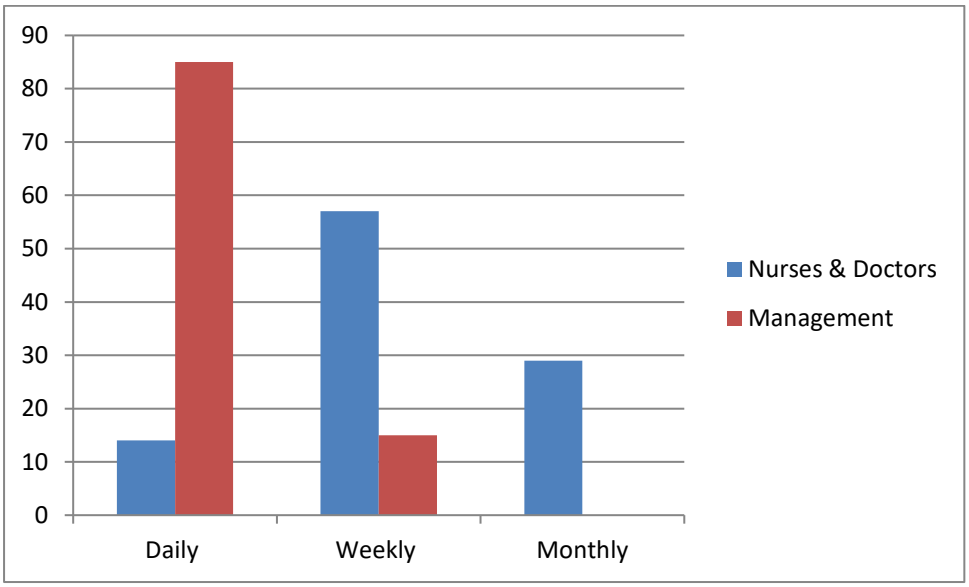
Out of 25 housekeeping people 100 percent responded that surface, tables and trolleys are regularly cleaned on daily basis but 75 percent amongst them also believed that walls are also cleaned on weekly basis in contrast with other staff while only 25 percent said that it was done on monthly basis.

FOR MANAGEMENT (N=20)

WET CLEANING	DAILY		WEEKLY		MONTHLY	
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
SURFACE	20	100				
WALLS			14	70	6	30
ICU TABLE	20	100				
TROLLEY	20	100		.		

Management strongly believed that ICU surface, tables and trolleys are cleaned daily and also a good percentage of 70 percent believed that walls in ICU are being cleaned on weekly basis which is quite different finding if compared with doctors and nurses.

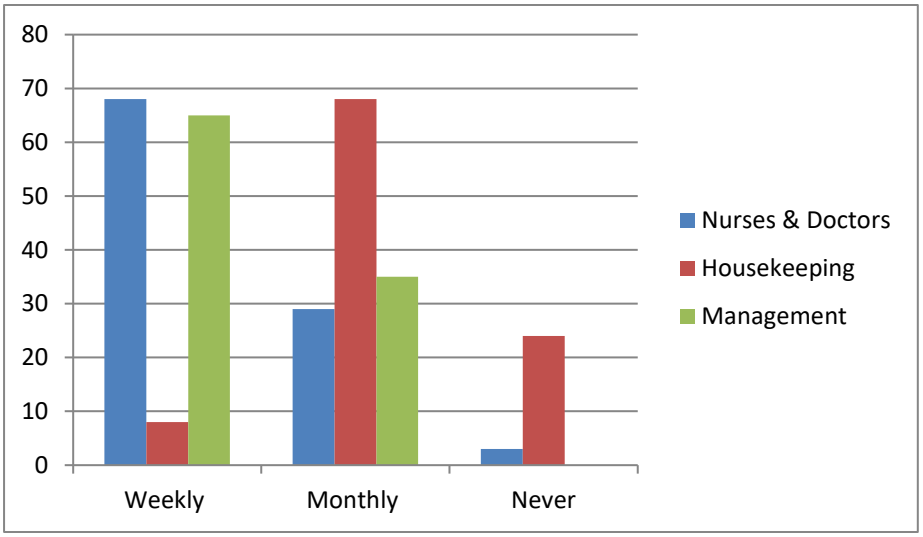
3.2.2 THE FREQUENCY OF MONITORING STERILIZING EFFICIENCY OF AUTOCLAVE (N=150)



NURSES & DOCTORS =105 MANAGEMENT =20

The above graph prevailed that 14% of the doctors and nurses reported that the monitoring of sterilizing efficiency of autoclave was done daily whereas 57 % responded reported that sterilizing efficiency of autoclave was monitored weekly, and rest 29% responded that it is done monthly while in case of management responses are quite different from that of doctors and nurses may be because management has regular monitoring on the sterilization process. 85% of management persons responded that monitoring sterilizing efficiency of autoclave was done daily and 15 % reported that sterilizing efficiency of autoclave was monitored weekly.

3.2.3 FREQUENCY OF FUMIGATION OF ICU



For Nurses and Doctors (N=105):

On analyzing the above graph, it was found that 68 percent respondents amongst doctors and nurses reported that fumigation has been done weekly, 29 percent said it was done monthly whereas only 3 percent reported that it was never been cleaned.

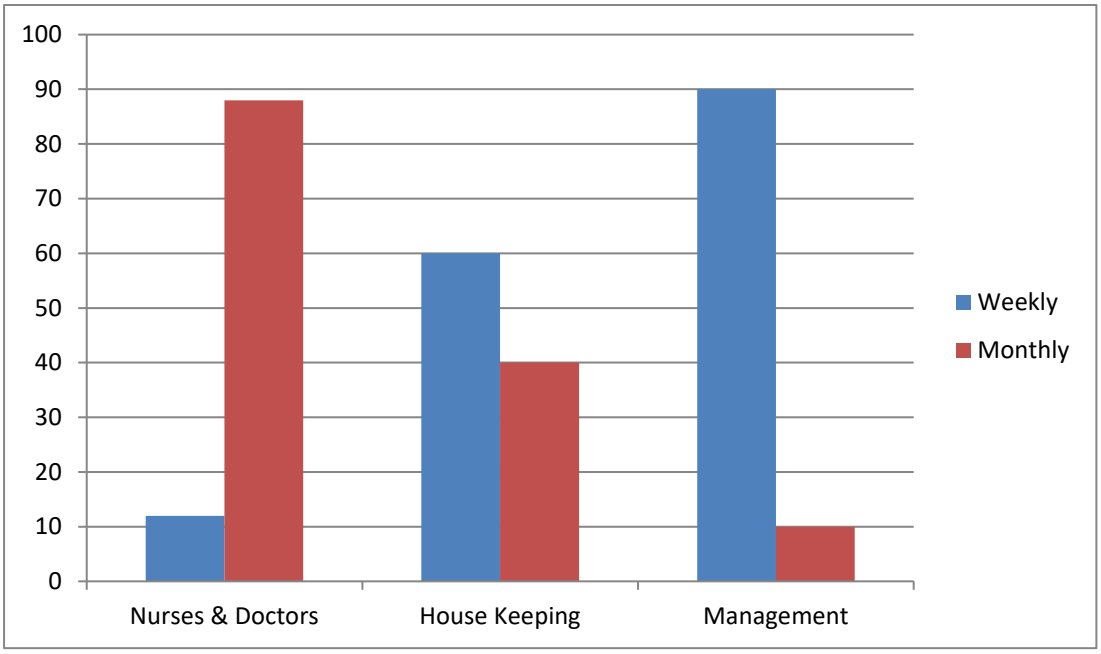
For Housekeeping (N=25):

Amongst housekeeping group, 8 percent respondents said that fumigation is not practiced at all while 68 percent said that it was done on monthly basis.

For Management (N=20):

65 percent respondents amongst management reported positively in case of practice of fumigation in ICU on weekly basis and 35 percent said that it is done on monthly basis. No respondent in management gave negative response for fumigation in ICU.

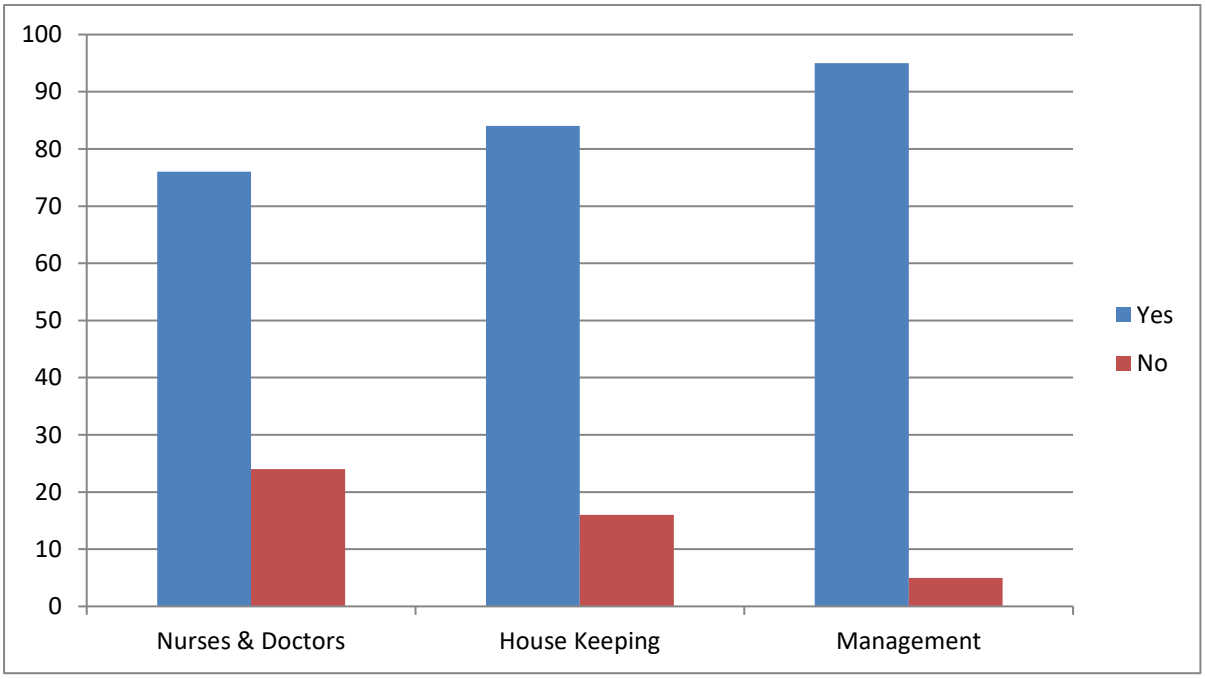
3.2.4 FREQUENCY OF CLEANING THE AIR CONDITIONER (N=150)



HOUSEKEEPING MANAGEMENT

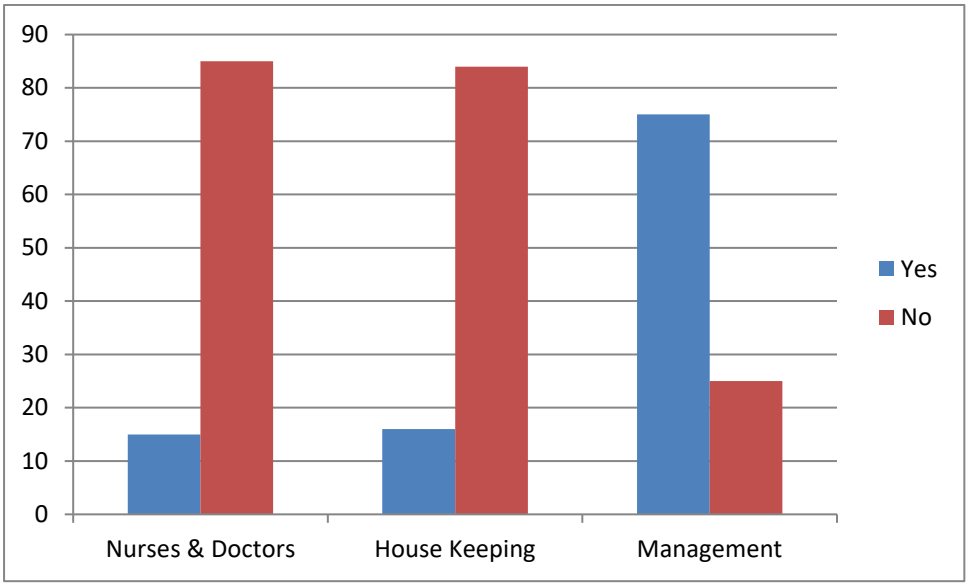
On analyzing the above graph, it is quite evident that none of the respondents (doctors & nurses, housekeeping and management) included for the study responded negatively regarding cleanliness of air conditioners placed in the ICU. 90 percent respondents amongst the management (where N- 20) strongly believed that air conditioners in the ICU are cleaned regularly on weekly basis. Only 10 percent amongst management respondents reported that air filter was cleaned monthly. The response amongst the medical staff including doctors and nurses (N=105) was opposite of the management where only 12 percent of them responded that it was cleaned weekly. Rest 88 percent said that it was being done only monthly. It needs further deep study that who is the respondents who are reporting affirmative and who are reporting positive. The response amongst the housekeeping was non directional as 60 percent respondents out of N=25 believed that cleaning of air filters is carried out weekly while 40 percent believed that the practice was carried out only monthly.

3.2.5 RESPONSE OF STAFF REGARDING HANDWASHING FACILITY (N=150)



On analyzing the above data, it was revealed that majority of the respondents amongst doctors & nurses, housekeeping and management reported that there were adequate hand washing facilities available in the hospital, where as only 24 percent amongst the doctors & nurses, 16 percent amongst the housekeeping and only 5 percent amongst the management reported that the facilities provided for hand washing were not adequate.

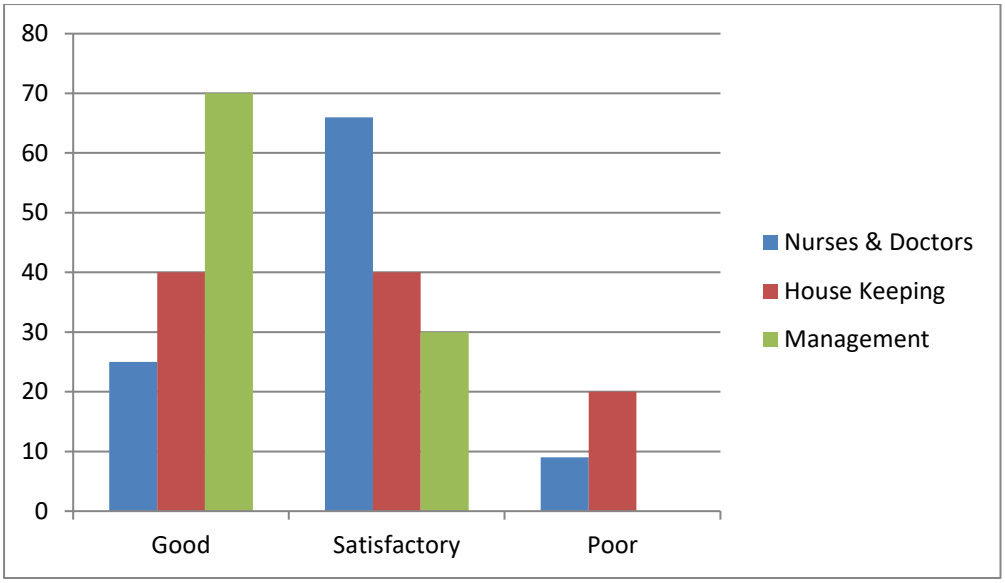
3.2.6 WHETHER ANY PROTOCOL IS FOLLOWED REGARDING HANDWASHING IN ICU (N=150)



On analysis of the above graph, to find out that whether any protocol is being followed for hand washing or not, it was revealed that 85 percent respondents amongst the doctors & nurses, 84 percent amongst the housekeeping and 75 percent amongst the management reported affirmatively that any protocol is not being followed in hand washing whereas only 15 percent, 16 percent and 25 percent amongst the doctors & nurses, housekeeping and management respectively were in the opinion that the protocol was followed while hand washing.

This implies that majority of the respondents included in the research study were aware of the facilities available for hand washing but they were not aware of the protocols to be followed regarding hand washing in ICU.

3.2.7 LEVEL OF SAFETY MEASURES FOLLOWED IN ICU



It is very important to follow adequate safety measures in ICU. Analysis of the above graph on safety measures followed in ICU revealed following findings:

For Doctors & Nurses (N= 105):

Out of N=105 respondents, only 25 percent respondents were found reporting of good on the safety measures followed in ICU while 66 percent of the respondents said that safety measures taken was only up to the satisfactory level, whereas 9 percent responses in terms of safety measures was poor.

For housekeeping (N=25):

As evident from above, the response for level of safety measures in ICU was negative in case of housekeeping group in comparison to management and doctors & nurses. Only 40 percent replied that the level of safety was good while 40 percent believed that it was satisfactory.

For Management (N-20):

No one in the management responded in a negative manner in case of the level of safety measures in ICU. Quite a good number of 70 percent respondents replied that the safety measures practiced in ICU were good while 30 percent said that the level of safety measures is only up to the satisfactory level.

3.2.8 RESPONSE OF STAFF REGARDING THE USE OF DOUBLE GLOVING FOR SERIOUSLY INFECTED PATIENT

For Nurses and Doctors (N=105):

It was observed that 82 percent respondents amongst doctors and nurses, were using the double gloves always while dealing with seriously infected patients whereas 17 percent respondents report to be using the double hand gloves not regularly but sometimes or often. Though it was satisfactory to note from the above table that there were only 1 percent respondents who were found never using the gloves while dealing with seriously infected patients.

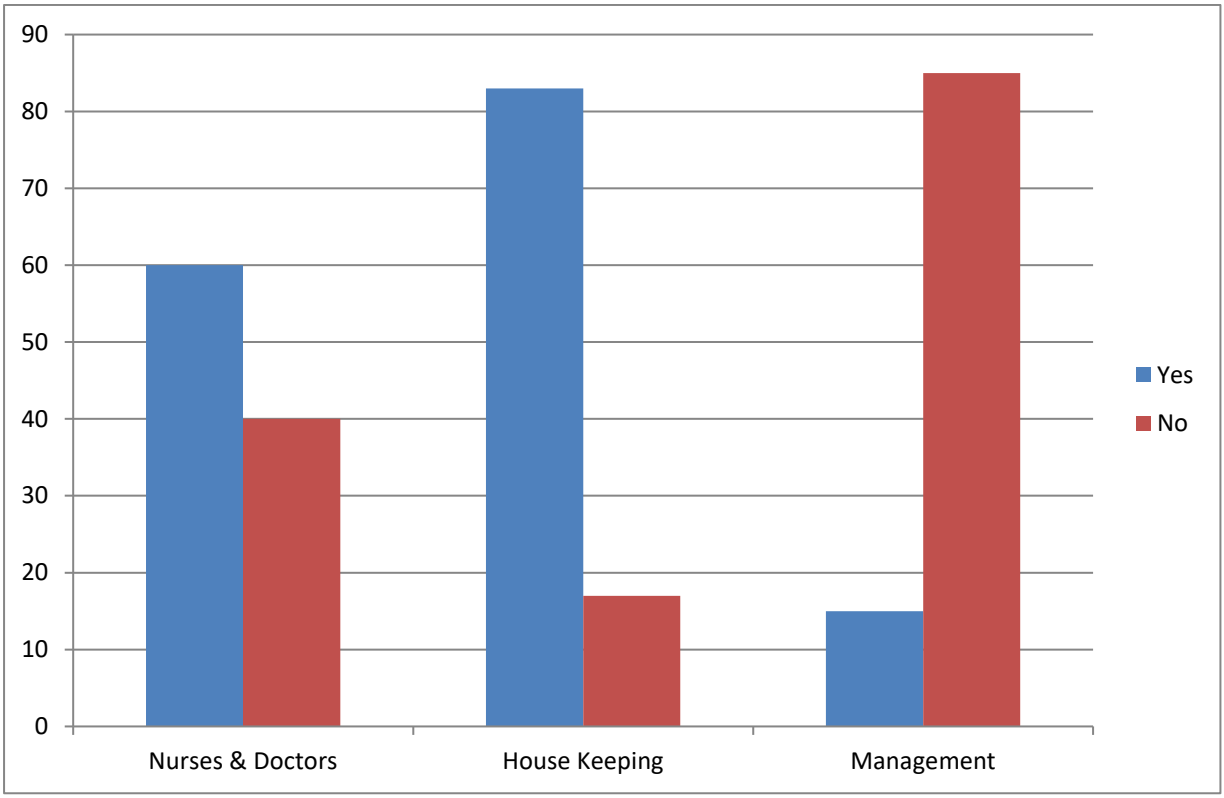
For Management (N=20):

According to management, 45 percent of the medical staff was using the double gloves either always or often while dealing with patient while only 10 percent said that double gloving was being practiced only in case of seriously infected patient.

For Housekeeping (N=25):

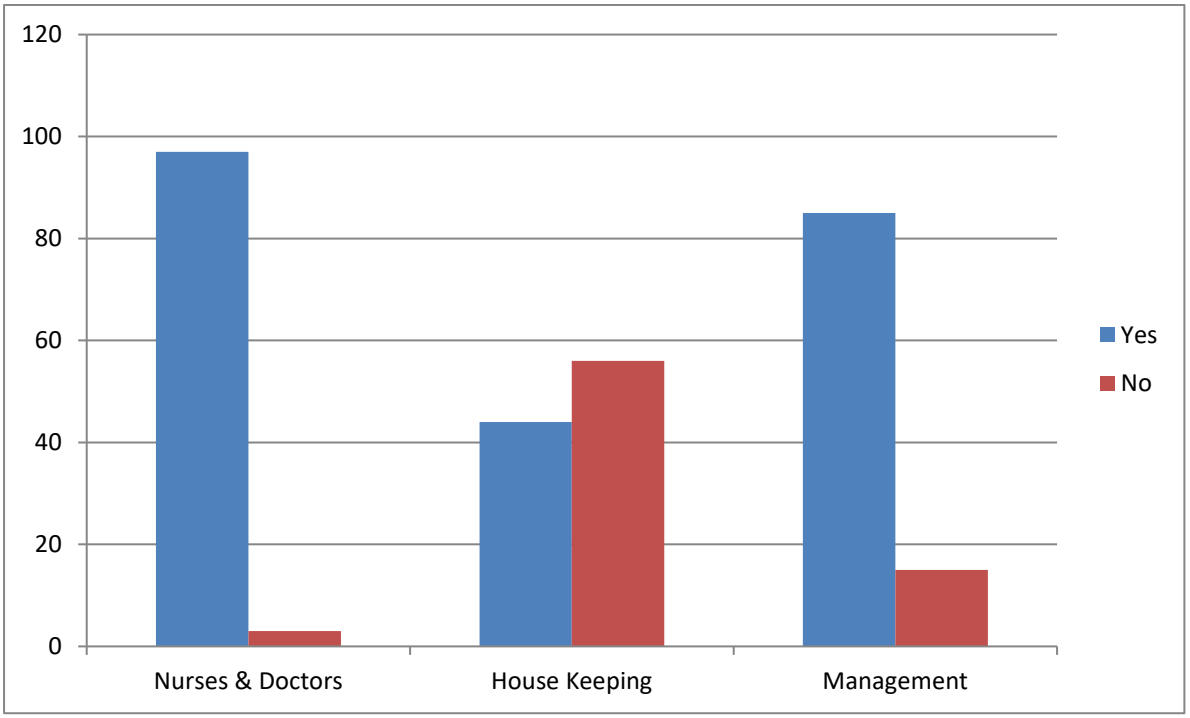
The status of the housekeeping group was not found to be satisfactory in case of use of double gloves while dealing with the patient. 28 percent of the housekeeping respondents said that they practiced double gloving only in case of seriously infected patient. Only 20 percent of the respondents always used the double gloves while 52 percent practiced double gloving only sometimes.

3.2.10 RESPONSE WHETHER STAFF DECONTAMINATE HAND FIRST AND REMOVE APRON BEFORE LEAVING WORKING AREA (N=150)



On analyzing the above graph, it was found that 60 percent respondents amongst the nurses and doctors and 83 percent respondents amongst the housekeeping staff reported that they decontaminate hand first and remove apron or hospital attire before leaving working area where as according to management people only 15 percent decontaminate hand first and remove apron or hospital attire before leaving working area. 40 percent respondents amongst the nurses and doctors, 17 percent amongst the housekeeping staff and 85 percent respondents amongst the management reported that they don't decontaminate hand and remove apron when leaving working area. Proper training of the staff is required regarding the same.

3.2.12 WHETHER CATEGORIZATION OF WASTE IS DONE WHILE BEING COLLECTED (N=150)



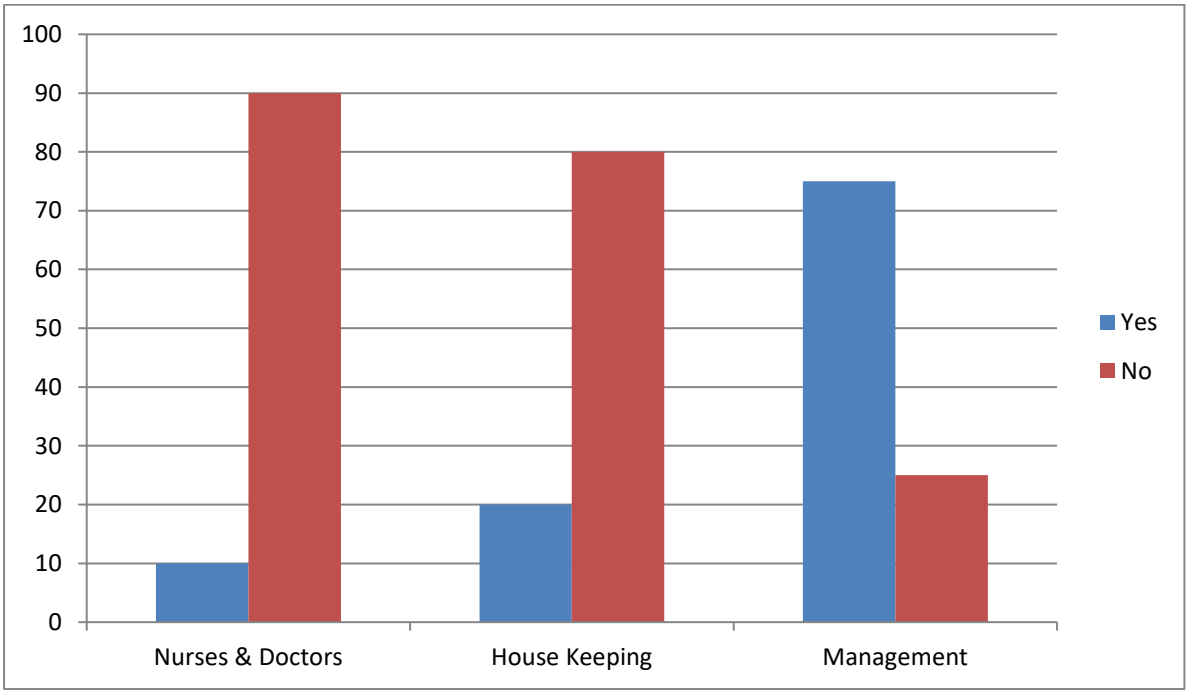
Analyzing the above data, revealed that majority of the respondents i.e. 97 percent amongst the doctors and nurses and 85 percent amongst the management reported that appropriate categorization of waste is done in ICU while being collected. Only 3 percent nurses and doctors and 15 percent management were not convinced about appropriate categorization of waste while being collected. Amongst the housekeeping staff, 44 percent said that proper categorization of waste is done while being collected while 56 percent said that te categorization of waste was not adequate and further training and efforts are required to know the importance of categorization of waste when it is being collected for safe disposal.

3.2.13 RESPONSE REGARDING THE CONTAINERS USED FOR WASTE COLLECTION IN ICU (N =150)

It was observed that 60 percent of respondents amongst nurses and doctors, 12 percent housekeeping and 70 percent management respondents said that bins with lid

are used for waste collection where as 30 percent nurses and doctors, 20 percent housekeeping and 20 percent management responded that bins without lid are used for waste collection in ICU. 10 percent nurses and doctors, 68 percent housekeeping people and 10 percent management believed that most of the waste in ICU is collected in plastic bags. Although both bins with lid and plastic bags are good process to collect the waste but stress should be given to collect waste in bins with lid.

3.2.14 WHETHER INFECTED WASTE IS DISINFECTED BEFORE DISPOSAL (N=150)



The graph highlights that 90 percent nurses and doctors, 80 percent housekeeping and 25 percent management staff responded that infected waste is not disinfected before disposal while only ten percent nurses and doctors and 20 percent housekeeping said that waste has been disinfected before disposal. Although 75 percent of the management strongly believed that disinfection of the waste is ensured before its final disposal. Proper disposal of the waste is an important step but still proper training and orientation is required.

CHAPTER 4 – DISCUSSION

It has been very well said that "Prevention is always better than cure".

4.1 STRATEGIES FOR PREVENTION OF INFECTION IN ICU IN A HOSPITAL:

There are three main strategies for the prevention of infection in Intensive Care Unit. These are as follows:

- Exclusion of source of infection.
- Breaking the chain of infection.
- 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.

4.2 PROBLEMS IDENTIFIED

- Staff Scarcity: Nurse Bed ratio is very low. So, due to scarcity of nurses the ward is not properly maintained and patients do not get individual attention.
- Housekeeping staff was inadequate; So the cleaning is not done properly.
- Improper maintenance of bed.
- Patient: attendant ratio is very high. So there is much noise in the ward thereby creating problems for other patients and the staff.
- Poor laundry and maintenance

4.3 LIMITATIONS OF THE STUDY

- Time is a limiting factor in this study.
- Resistance of staff towards training.
- Resistance towards documentation.

CHAPTER 5 - RECOMMENDATIONS AND CONCLUSION

5.1 RECOMMENDATIONS

- All patient, staff and visitors to the ICU at LBSH should be included in the infection control program. No unnecessary visitors be allowed and SOP on all visitors to be made and strongly implemented.
- Gloves, masks, eye protection, other protective equipments, soap and disinfectants should be made available at the ICU at LBSH and should be available and used correctly when required.
- Internationally acceptable hand hygiene guidelines are generated by World Health Organization (WHO) for disease control and prevention. These should be available as an SOP at the ICU and promptly displayed at ICU in LBSH. Education of staff to be done.
- Proper facilities and adequate resources are provided to support the infection control program. It includes hand washing facilities in all patient care areas and accessible to health care providers at LBSH.
- Nursing staff at LBSH should be regularly trained, once a quarter on aspects of hygiene.
- Housekeeping staff at LBSH should have SOP on
    - Disposal of syringes and needles.
    - Waste management
    - Cleaning of floors, walls and AC.
- Dedicated training of Housekeeping staff.

5.2 CONCLUSION

The study revealed that current physical facilities available for infection control are satisfactory but that existing infection control measures practiced in Intensive Care Unit needs improvement and up-gradation. The standard quality care and adequate infection control in Intensive Care Unit can be achieved by:

- The development of an effective surveillance system.
- The development of policies to reduce risk of hospital acquired infection.
- The maintenance of a continuing education programme for hospital personnel.

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ANNEXURES

QUESTIONNAIRE FOR DOCTORS, NURSES AND MANAGEMENT CLEANING PROCEDURES

1) How often is wet cleaning of ICU done?
    a. Surface - daily/ weekly/ routinely/ if other specify
    b. Walls- daily/ weekly/ routinely/ if other specify
    c. ICU table - daily/ weekly/ routinely/ if other specify
    d. Trolleys- daily/ weekly/ routinely
2) How often fumigation is done in ICU?
    a. Weekly b) Monthly c) Daily
3) How frequently does the filters of Air Conditioners are cleaned?
    a) Weekly b) Monthly c) Daily

STERILIZATION PROCEDURES

4) How frequently you monitor the sterilizing efficiency of autoclave?
    a. Weekly b) Monthly c) Daily

PREPARATION OF ICU STAFF

5) Do you have adequate hand washing facilities?

Yes/No

6) Do you follow any protocol regarding hand washing? Yes / No
7) Do you take precautions in case of any accidents like needle- stick injury?
8) Do you decontaminate your hand first and then remove your apron before leaving working area? a) Yes b) No
9) What is the frequency of waste collection in ICU? a) Once a day b) Twice a day
10) Is there any categorization of waste while being collected? a) Yes b) No
11) What are the containers used for collection of the waste?
    a. Bins with lid
    b. Bins without lid
    c. Plastic bag
12) Is the infectious waste disinfected before disposal? a) Yes b) No

EMPLOYEE HEALTH AND TRAINING

13) Have you been received formal training regarding hospital acquired infection control? Yes/ No

14)Do you maintain any kind of infection rate register? Yes / No

15)Do you undergo periodic health check up? Yes / No

16)Have you undergone immunization relevant to your work ? Yes / No