A STUDY OF HOSPITAL ACQUIRED INFECTION: ON NOSOCOMIAL INFECTION MANAGEMENT

Dr. Satpal Singh¹, Dr. Naveen Antil²

¹Assistant Professor, Department of Management Studies, Deenbandhu Chhoturam University of Science and Technology Murthal, Sonepat
²Masters of Hospital Administration, Deenbandhu Chhoturam University of Science and Technology Murthal, Sonepat

ABSTRACT

BACKGROUND: Hospital is an integral part of social and medical organization, the function of which is to provide the population complete health care that is both curative and preventive. This is so because patient care requires an sterilized and disinfected environment and treatment, and this enables the clinical team, as well as the hospital administrator, to evaluate the quality of medical care, and the effectiveness of the hospital services. This study is based on some objectives, to evaluate the existing cleaning, sterilization and disinfectant techniques which are practically used in the medical system.

METHODS: The study includes Nurses, Doctors and other staff of the B.P.S. Medical College & Hospitals of the Sonepat district, Haryana.

Direct questionnaire method is used to collect the information regarding cleaning, sterilization and disinfection procedures using in hospital to prevent the Nosocomial infections.

RESULTS: The study revealed that current physical facilities available for infection control are satisfactory, but that existing infection control measures practised in ICU is poor and need improvement and up-gradation.

CONCLUSIONS: The infection control measures are poor in ICU, in fact which is the most important part of the hospital, due to scarcity of the staff and negligence of the existing staff.

KEY WORDS: ICU
1. INTRODUCTION

Hospital acquired infections are common in all hospitals. It can be defined as the infection that a patient develops during the period of stay in the hospital. Cleaning is the first main thing for the hospital, if hygiene is not maintained in the hospital, then patient will definitely suffer from hospital acquired infections. Sterilization procedures are also important because different types of instruments are used for different patients to protect the patient from acquired infection sterilization is required. And ICU is also another unit of the hospital which we can’t neglect as the name indicates intensive care unit for providing intense care. In case of waste management system it is used to protect the persons, who are outside the hospital, proper disposal of hospital waste is required.

Each hospital has a committee and a team to check for the rate of hospital acquired infections. Bhagat Phool Singh Medical College for Women & Hospital has a specific team for their hospitals to manage hospital acquired infections. Infection control team in hospitals has,

1. Infection Control Director, (senior Consultant),
2. Head, House Keeping,
3. Chief Nurse (infection Control)
4. Infection Control Nurse (Operation Theatres)
5. Infection Control Nurse (Critical Care Unit)
6. Infection Control Nurse (Wards)

Other than this each ward has an In-Charge for Infection Control specially trained in that Hospital acquired infections are four types,

1. Ventilated associated pneumonia (VAP)
2. Blood streamline infections (BSI)
3. Urinary Tract infections (UTI)
4. Surgical Site Infections (SSI)

This project is about the method of surveillance for data collection, prophylaxis or preventive measures given to patients, treatment given after infections, effective control, management and minimization of infection rate.

Each type of infection has a unique bench mark depending upon the bed strength of the hospitals. Hospital acquired infections are difficult to eradicate fully but can be kept under control. When the rate of infection exceeds the bench mark infection control committee and team has to work effectively to bring them under control. Control measure for each infection differs according to the nature of infections and the characteristics of micro organisms behind the infection.

2. REVIEW OF LITERATURE

[2013]Flodgren G, Conterno LO, Mayhew A, Omar O, Pereira CR, Shepperd S[^1]. In the study titled “Interventions to improve professional adherence to guidelines for prevention of device-related infections.” Stated that the low to very low quality of the evidence of studies included in this review provides insufficient evidence to determine with certainty which interventions are most effective in changing professional behavior and in what contexts. However, interventions that may be worth further study are educational interventions involving more than one active element and that are repeatedly administered
over time, and interventions employing specialised personnel, who are focused on an aspect of care that is supported by evidence e.g. dentists/dental auxiliaries performing oral care for VAP prevention.

[2012]M Rosa Jam Gatell, RN, Montserrat Santé Roig, RN, Óscar Hernández Vian, RN, MsC, MPH, Esther Carrillo Santín, RN, Concepción Turégano Duaso, RN, Inmaculada Fernández Moreno, RN, and Jordi Vallés Daunis, MD, PhD in the study titled “Assessment of a training programme for the prevention of ventilator-associated pneumonia” stated that the positive results obtained in this study lend support to the CDC’s recommendations to reinforce training to improve adherence to VAP preventive strategies. Training activities and evidence-based protocols aimed at ICU nurses, improving the care quality and narrowing the gap between scientific knowledge and actual performance. The training programme improved ICU nurses' theoretical knowledge and adherence to VAP preventive measures. The results yielded show that the training programme carried out improved nurses' knowledge and clinical practice regarding VAP preventive strategies. It should be pointed out that information obtained from the two questionnaires clearly shows that nurses' scientific knowledge is not necessarily applied in daily practice, which justifies the need of training strategies to reinforce adherence to preventive measures against VAP. A new line of research should look into the reasons why ICU nurses do not put into clinical practice the measures they know are important. A change in professional practice will only be possible through in-depth knowledge of the reasons for non-adherence to these guidelines.

[2011]David D. Wirtschafter, MD, corresponding author.a Richard J. Powers, MD,b Janet S. Pettit, MSN, NNP-BC, CNS,c Henry C. Lee, MD, MS,d W. John Boscardin, PhD,e Mohammad Ahmad Subeh, MA,f and Jeffrey B. Gould, MD, MPHg in the title “Nosocomial Infection Reduction in VLBW Infants With a State wide Quality-Improvement Model” stated that the brief, structured interventions can work and should be considered as part of the spectrum of interventions that knowledge dissemination managers and NICU quality-improvement leaders consider when designing practice-influencing projects because they balance factors such as the population to be served, the breadth and complexity of the topic addressed, the effects desired, and the resources available. Both methods and results are generalizable throughout the neonatal community in particular and in other intensive care environments.

[2011]Tao L, Hu B, Rosenthal VD, Gao X, He L. In the study titled “Device-associated infection rates in 398 intensive care units in Shanghai, China: International Nosocomial Infection Control Consortium (INICC) findings.” Concluded that DA-HAI’s in the ICUs of Shanghai pose a far greater threat to patient safety than in ICUs in the USA. This is particularly the case for the VAP rate, which is much higher than the rates found in developed countries. Active infection control programs that carry out infection surveillance and implement prevention guidelines can improve patient safety and must become a priority.

[2009]Ji-Guang Ding,1 Qing-Feng Sun, Ke-Cheng Li, Ming-Hua Zheng, Xiao-Hui Miao, Wu Ni, Liang Hong, Jin-Xian Yang, Zhan-Wei Ruan, Rui-Wei Zhou, Hai-Jiao Zhou, and Wen-Fei He in the study titled “Retrospective analysis of nosocomial infections in the intensive care unit of a tertiary hospital in China during 2003 and 2007” Stated that there was a high and relatively stable rate of nosocomial infections in the ICU of a tertiary hospital in China through year 2003–2007, with some differences in the distribution of the infection sites, and pathogen and antibiotic susceptibility profiles from those reported from the
Western countries. Guidelines for surveillance and prevention of nosocomial infections must be implemented in order to reduce the rate.”

[2007] Rudra and Rudra[6] 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 (LLW) 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.

[2007] According to Burke[7], 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 to $5.7 billion per year to the costs of the patient care. [2006] Moreno CA, Rosenthal VD, Olarte N, Gomez WV, Sussmann O, Agudelo JG, Rojas C, Osorio L, Linares C, Valderrama A, Mercado PG, Bernate PH, Vergara GR, Pertuz AM, Mojica BE, Navarrete Mdel P, Romero AS, Henriquez D[8] in the title “Device-associated infection rate and mortality in intensive care units of 9 Colombian hospitals: findings of the International Nosocomial Infection Control Consortium.” Concluded that the rates of DAI in the Colombian ICUs were lower than those published in some reports from other Latin American countries and were higher than those reported in US ICUs by the NNIS. These data show the need for more-effective infection control interventions in Colombia.

[2004] A P R Wilson, C Gibbons, B C Reeves, B Hodgson, M Liu, D Plummer, Z H Krukowski, J Bruce, J Wilson, A Pearson[9], in the study titled “Surgical wound infection as a performance indicator: agreement of common definitions of wound infection in 4773 patients” Concluded that Small changes made to the CDC definition or even in its interpretation, as with the NINSS version, caused major variation in estimated percentage of wound infection. Substantial numbers of wounds were differently classified across the grades of infection. A single definition used consistently can show changes in percentage wound infection over time at a single centre, but differences in interpretation prevent comparison between different centers.

[2001] R. P. Wenzel and M. B. Edmond[10] in the study title “The impact of hospital-acquired bloodstream infections.” Nosocomial bloodstream infections are a leading cause of death in the United States. If we assume a nosocomial infection rate of 5%, of which 10% are bloodstream infections, and an attributable mortality rate of 15%, bloodstream infections would represent the eighth leading cause of death in the United States. Because most risk factors for dying after bacteremia or fungemia may not be changeable, prevention efforts must focus on new infection-control technology and techniques.

3. METHODS

Research methodology

The present research study is qualitative in nature & based in BPS Medical College & Hospital Khanpur Kalan, Sonipat Haryana. 30 samples of health care professionals have been taken which are working in I.C.U.
Area covered under the sample

The area on field of the study was taken in intensive Care Units (I.C.U.) of BPS Govt. Medical College, Khanpur.

Sample size

It is universally accepted that “Bigger the size of the sample. Greater the representative of the whole universe it is”. But the above advantage becomes of little avail when we consider the time and cost involved to handles a large sample. The same has tried to do in the present case and so sample size is restricted to 10 Doctors & 20 nurses.

Data Collection

For present study, primary data are collected by personal interviews, and 2 set of questionnaires, one to be filled up by Medical officers & second to be filled by nursing staff. A number of questions pertaining to the cleaning, sterilization and disinfectant procedures used in hospital are framed and these questions are presented in proper sequence. Most of the questions are of multiple choices and close ended type and filled by using survey method.

OBJECTIVE OF THE STUDY

This study is based on some objectives, which are as under:

- To study the physical facilities available for infection control in the ICU of BPS medical college and hospital.
- To study the existing infection control procedures used in the ICU of BPS medical college and hospital to identify gaps (if any) and to give recommendations.

4. DATA ANALYSIS AND INTERPRETATION

4.1 RESPONSE OF HEALTHCARE PROFESSIONALS REGARDING CLEANING & FUMIGATION OF I.C.U.

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Questions</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How often is wet cleaning of ICU done?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Surface</td>
<td>0</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>b)</td>
<td>Walls</td>
<td>16</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>c)</td>
<td>ICU table</td>
<td>0</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>d)</td>
<td>Trolleys</td>
<td>0</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>How often do you fumigate ICU?</td>
<td>1</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>How frequently do you clean filters of air conditioners?</td>
<td>14</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>How frequently do you monitor the sterilizing efficiency of autoclave?</td>
<td>9</td>
<td>7</td>
<td>14</td>
</tr>
</tbody>
</table>

This figure shows the response of doctors and nurses on first question about wet cleaning of I.C.U surface is cleaned daily all of 30 says this, walls are cleaned 46.66%sayes daily and 53.33%sayes weekly, I.C.U table is cleaned daily and trolleys are also cleaned daily
as per response of sample. From the above figure it is evident that out of two questions
96.66% strongly agree that fumigation of I.C.U is done on a month basis while 3.33% of
respondents say fumigation is done weekly. When the response of the respondents was
analyzed towards cleaning of air filters of air conditioners it was found that 53.33% says yes
that cleaning of filter is done monthly while 46.66 of the staff say it is done weekly.
This figure shows response about monitoring the sterilization efficiency of autoclave
46.66% says that daily monitoring is done, 30% says that it is done weekly and 23.33% says
that it is done monthly.

4.2 RESPONSE OF HEALTHCARE PROFESSIONALS REGARDING
STERILIZATION PROCEDURES

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Questions</th>
<th>Yes</th>
<th>No</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Do you adequate space available for sterilization activities?</td>
<td>30</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>2.</td>
<td>Do you monitor the sterilizing of autoclave?</td>
<td>9</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>3.</td>
<td>Do you use any marker to indicate the packs that you received in ICU that have been sterilized?</td>
<td>29</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>4.</td>
<td>Do you have an established recall procedure when breakdown in the sterilization system is identified?</td>
<td>16</td>
<td>14</td>
<td>30</td>
</tr>
</tbody>
</table>

This figure shoes the response that100% respondents says that there is proper space
for sterilization.70% says that there is no monitoring of efficiency of sterilization while 30%
says that monitoring is done. 96.66% says that there are markers of sterilization while 3.34%
says there are no markers of sterilization. 53.33% says that there is recall procedure for
breakdown of sterilization while 46.67 says that there is no recall procedure for breakdown of
sterilization.
4.3 RESPONSE OF HEALTHCARE PROFESSIONALS REGARDING PREPARATION FOR I.C.U.

Table no. 4.3

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>questions</th>
<th>Yes</th>
<th>No</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you have adequate hand washing facilities?</td>
<td>30</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Do you follow any protocol regarding hand washing?</td>
<td>30</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Do you think hand washing facilities in all patient care areas are accessible to health care providers?</td>
<td>30</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>Do you use disposable gloves and masks?</td>
<td>30</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Do you decontaminate the equipment?</td>
<td>27</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>Do you decontaminate your hand first and then remove your apron before leaving working area?</td>
<td>30</td>
<td>0</td>
<td>30</td>
</tr>
</tbody>
</table>

Figure 4.2 explain that the hundred percentage says that there is adequate hand washing, there is protocol regarding hand washing, hand washing is accessible to health care persons, there is use of disposable gloves and masks and health care persons decontaminate hands before removing the apron. Ninety six percentages says that equipments are decontaminated while four percentages of the staff says that equipments are not decontaminated.

RESPONSE OF HEALTHCARE PROFESSIONALS REGARDING HEALTH AND TRAINING

Table no. 4.4

<table>
<thead>
<tr>
<th>Sr. no</th>
<th>Questions</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Have you been received formal training regarding hospital acquired infection control?</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Do you maintain any kind of infection rate register?</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Do you undergo periodic health check up?</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Have you undergone immunization relevant to your work?</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Has the staff been infected from any disease excluded from their work?</td>
<td>0</td>
<td>30</td>
</tr>
</tbody>
</table>
Hundred percent staff has received training regarding hospital acquired infection. Fifty percent staff says that a register is maintained regarding the infection rate. Eighty six percent says that the staffs undergo periodic health check up. Eighty six percent says that they have undergone immunization relevant to their work. Hundred staff says that none of staff is infected from any disease excluded from their work.

5. FINDING AND SUGGESTIONS

The major findings of the study are as follows:

The physical facilities available for infection control in hospital are satisfactory but the infection control measures practiced in ICU is poor and needs improvements and Upgradation:

- Wet cleaning of I.C.U surface is cleaned daily, walls are cleaned 46.66% sayes daily and 53.33% says weekly, I.C.U table is cleaned daily and trolleys are also cleaned daily.
- Solution used for cleaning in the I.C.U 100% says that soap, water and phenol are used for cleaning the I.C.U. surface.
- 96.66% strongly agree that fumigation of I.C.U is done on a month basis while 3.33% of respondents say fumigation is done weekly.
- Cleaning of air filters of air conditioners 53.33% says yes that cleaning of filter is done monthly while 46.66% of the staff say it is done weekly.
- 100% says that there is proper space for sterilization.
- 70% says that there is no monitoring of efficiency of sterilization while 30% says that monitoring is done.
- 96.66% says that there are markers of sterilization while 3.34% says there are no markers of sterilization.
- 53.33% says that there is recall procedure for breakdown of sterilization while 46.67 says that there is no recall procedure for breakdown of sterilization.
• The monitoring of the sterilization efficiency of autoclave 46.66% says that daily monitoring is done, 30% says that it is done weekly and 23.33% says that it is done monthly.
• The hundred percentage says that there is adequate hand washing, there is protocol regarding hand washing, hand washing is accessible to health care persons, there is use of disposable gloves and masks and health care persons decontaminate hands before removing the apron.
• Ninety six percentages says that equipments are decontaminated while four percentages of the staff says that equipments are not decontaminated.
• Medical staff enters in ICU eighty three percent says that they enter ICU with fully covered hair and seventeen percent say they sometime covers the hair.
• Seventy six percent says they wear shoe cover before entering the ICU while twenty four percent say they sometime wear the shoe cover while entering the ICU.
• The reporting is done to the in charge of the department hundred percent says that reporting is done but record is not maintained.
• Hundred percent says they put on the apron after entering the concerned department.
• Ninety six percent says that staff is given training regarding waste disposal and while four percent have not received training regarding waste disposal.
• Ninety six percent says that waste is been categorization while been collected and sixty six percent says that infectious waste is disinfected before disposal. While four percent say there is no waste categorization and waste is not disinfected before disposal. Bacteriological testing of air is not done.
• No antibiotic policy is available or followed
• No standard operating manual is maintained in ICU
• No protocol is followed regarding wearing gloves.
• Eighty percent says that waste is collected ones in a day from ICU and twenty percent says that waste is collected twice a day from the ICU.
• Ninety six percent of the staff response that gloves, aprons and masks are used while handling the waste. While four percent response that only gloves are used for handling the waste.
• Seventy percent of the respondent says that bins with lid are used to collect waste from ICU. While thirty percent says that bins without lid are used for waste collection.
• Fifty three percent says that the waste is store in ICU is in the corner of the department while forty seven percent says that waste is stored in dirty utility room of the ICU.
• Sixty percent says that for dispose of infected waste is taken to the municipal collection point while forty percent says that incineration is done.
• Hundred percent staff has received training regarding hospital acquired infection.
• Fifty percent staff says that a register is maintained regarding the infection rate.
• Eighty six percent says that the staffs undergo periodic health check up.
• Eighty six percent says that they have undergone immunization relevant to their work.
• Hundred percent staff says that none of staff is infected from any disease excluded from their work.
• Hundred percent staff learned about hospital acquired infection during nursing or technical curriculum verbal instruction of supervisor and written guidelines does not work.
• Hand disinfection of hand by staff is done first and then removes their apron while leaving the working area.
• Hand disinfection is carried out by staff members but need some upgradation.

After conducting the study and obtaining the results it was found that the existing physical facility is satisfactory but the measure for infection control being taken are not up to the mark.

RECOMMENDATIONS

The study revealed that current physical facilities available for infection control are satisfactory but that existing infection control measures practiced in ICU is poor and need improvement and up-gradation. Some the recommendations based on data analysis are listed below:

• The staff is aware of the procedures but some of them don’t follow them routinely so frequent training session to be organized.
• Frequent checks to be done that infection control are satisfactory.
• Strict protocol procedure to be followed.
• The areas lacking standard procedures need to looked into and corrected.
• Hand washing technique to be followed by the rest of the hospital.
• Air sample should be tested for bacteriological studies regularly.
• A standard operating manual should be maintained in ICU.

Nosocomial infection required a special attention as the results of it, can spoil the reputation of the hospital and in the long lasting process it may bring the hospital to end. A good management of the nosocomial infection in hospital will help the patients to heal up early reducing the stay of the patient in the hospital overall decrease in the expenditure of government on the health of the people of the state. This is not the full version of the check of the management of the nosocomial infection in the hospital but a try to get the picture of the management going in the hospital for the check of the nosocomial infection.

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21. Dr. Satpal Singh and Dr. Pankaj, “Health Care Quality Assurance: Emergency Department of a Tertiary Care Hospital”, International Journal of Advanced Research in Management (IJARM), Volume 5, Issue 1, 2013, pp. 31 - 41. ISSN Print: 0976 – 6324, ISSN Online: 0976 – 6332.