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Study Of Impact Of Awareness Program For Staff Of Acute Medical Care Unit In Controlling Ventilator Associated Pneumonia

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Abstract : *Ventilator-Associated Pneumonia (VAP) is a serious complication of mechanical ventilation which increases the patient's stay in the ICU and overall length of hospital stay and adds to overall costs.Our study aims to reduce Incidence of Ventilator Associated Pneumonia, with effective uses of limited resources and to identifying good management practices in AMCU and prove it statistically.In our study, 470 ventilated patients admitted in AMCU from January 2013 to December2013 were considered. Entire study was divided into four phases based on three specific objectives viz., observation, assessment, implementation and evaluation. Of the organisms isolated A. baumannii was isolated in18 patients and P. aeruginosa was isolated in 31.03% and 24.13%respectively. Average VAP rate reduction was found to be*
Statistically Significant*.Average Length of Stay reduction was found to be*
Statistically Significant*. It was found that increase in score was statistically not significant with education level and critical years of experience.Increase in knowledge was found to be*
Highly Statistically Significant*..Preventive Practices compliance improved from 33 % to 40.11 % in hand washing, 78.30% to 83.10 % in oral care and 86.70 % to 92.60% in ventilator bundle.It is found out that if the knowledge level on evidence based guidelines on prevention of VAP of staff working in AMCU's is known it will facilitate educational strategies to assist staff in their role of providing safe care to patients as well as for further development in safe practices as an evidence based practice.*

Keywords: *Ventilator Assosiated Pneumonia,Acute Medical Care Unit(AMCU),Length of Stay,Ventilator Days,Preventive Practices,Pre-Test and Post Test*

I. Introduction

A nosocomial infection — also called "hospital acquired infection" can be defined as: An infection acquired in hospital by a patient who was admitted for a reason other than that infection (WHO; 2002). An infection occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge and also occupational infections among staff of the facility (WHO; 2002).Many factors promote infection among hospitalized patients: decreased immunity among patients; the increasing variety of medical procedures and invasive techniques creating potential routes of infection; and the transmission of drug-resistant bacteria among crowded hospital populations, where poor infection control practices may facilitate transmission.

Frequency Of Infection

Hospital-acquired infections add to functional disability and Nosocomial infections occur worldwide and affect both developed and resource-poor countries. They are a significant burden both for the patient and for public health. A prevalence survey conducted under the auspices of WHO in 55 hospitals of 14 countries representing 4 WHO Regions (Europe, Eastern Mediterranean, South-East Asia and Western Pacific) showed an average of 8.7% of hospital patients had Nosocomial infections. At any time, over 1.4 million people worldwide suffer from infectious complications acquired in hospital. The highest frequencies of Nosocomial infections were reported from hospitals in the Eastern Mediterranean and South-East Asia Regions (11.8 and 10.0% respectively), with a prevalence of 7.7 and 9.0% respectively in the European and Western Pacific Regions. The most representative data on nosocomial infection rates have been provided by the National Nosocomial Infections Surveillance (NNIS) system[1].NNIS data indicate that today's typical hospitalized patient may be sicker than in former years.

Impact of nosocomial infections

Hospital-acquired infections add to functional disabilityemotional stress of the patient and may, in some cases, lead to disabling conditions that reduce the quality of life. Nosocomial infections are also one of the

leading causes of death. The economic costs are considerable. The increased length of stay for infected patients is the greatest contributor to cost.

Ventilator Associated Pneumonia

Ventilator associated pneumonia (VAP) is defined as a type of pneumonia in a patient receiving mechanical ventilation that was not present at the time of admission to hospital or that occurs 48 hours after intubation and mechanical ventilation. It is characterized by a new or a progressive pulmonary infiltrate, fever, leukocytosis and purulent trachea-bronchial secretions[2, 3] .Pneumonia accounts for nearly 15% of all hospital acquired (nosocomial) infections and 24% to 27% of all those acquired in coronary care units and medical intensive care units (ICU) respectively[4, 5]. Ventilator-Associated Pneumonia (VAP) is a serious complication of mechanical ventilation which increases the patient's stay in the ICU and overall length of hospital stay and adds to overall costs[6, 7.] VAP is the most common of all nosocomial infections which contribute to death[8] .In spite of extensive worldwide efforts to understand, prevent and treat this complication,[8,9] a mortality rate of approximately 30% still exists[10] .Several organizations and institutions[9,10,11] have recommended strategies and approaches in an effort to address this problem.Although increased attributable mortality in this group is controversial,[12,13,14-18] it is clear that those with VAP spend additional days on the ventilator,6 additional days in the ICU,[12-15,17] and additional days in the hospital[12-15]. Evidence-based clinical practice guidelines aimed at reducing VAP have been available for many years and include dozens of clear prevention strategies. Although the optimal approach to reducing ventilator associated pneumonia is unclear, studies[19–23] indicate that educating health-care workers who care for patients receiving mechanical ventilation can decrease the rate of ventilator-associated pneumonia. Although the optimal approach for reducing the rate of VAP remains unclear, previous studies indicate that educating health care workers about how to prevent VAP and implementing policies and procedures to improve ventilator care can decrease rates of VAP [24–29]. Patient recovery may be delayed and other risks of complications from mechanical ventilation can be prevented. Prevention and control of ventilator associated pneumonia are dependent on education and awareness of ICU staff towards the problem and on the application of evidence based strategies[30]. Adherence to the evidence based guidelines on prevention of ventilator associated pneumonia will occur once staff involved directly with the patient's care has knowledge of such guidelines and can put them into practice.

Purpose of this Research

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.This research aims to be a practical, basic, resource which may be used by individuals with an interest in nosocomial infections and their control, as well as those who work in Nosocomial infection control in health care facilities. It is applicable to all facilities, but attempts to provide rational and attainable recommendations for facilities with relatively limited resources. The information should assist administrators, infection control personnel, and patient care workers in such facilities in the initial development of a nosocomial infection control programme, including specific components of such programmes.

II. Aims And Objectives

1) The aim is the reduction of Incidence of Ventilator Associated Pneumonia, with effective uses of limited resources.
2) Identifying good management practices in AMCU and prove it statistically.

Objectives:

The specific objectives of study include:

Primary objectives:

1. To study the personal & environmental hygiene and several aseptic measures adopted by the healthcare staff in AMCU.
2. To find out the prevalence of Ventilator Associated Pneumonia in AMCU.

Secondary objectives

1. To suggest the measures to reduce or minimize Ventilator Associated Pneumonia specially by applying the Information on control of VAP, Education /Training of Health Care staff and Communication system (IEC).
2. Try to evaluate the outcome after the corrective measures if implemented.

III. Materials And Methods

1.Study Location

This was a prospective interventional study was conducted at Acute Medical Critical care unit (AMCU) of a tertiary level super specialty hospital in Hyderabad. The hospital has separate coronary care and postoperative intensive care units.

2. Study Population/Patients

1. All patients admitted or transferred into the AMCU and fulfill the inclusion/exclusion criterias as stated below.

2. All staff in Critical Care which includes Doctors, Nursing staff, Class 4 staff (house keeping staff, transport boys etc).

3. Inclusion Criteria

1) Patient in Acute Medical Care Unit in whom the Ventilator Associated Pneumonia was not present or incubating at the time of admission.
2) Ventilator Associated Pneumonia acquired in Acute Medical Care Unit but appearing after discharge.
3) Patients having hospital stay of more than 48 hours.
4) The Critical Care Staff Members

I. Who are available to take care of the patients.
II. Who are willing to participate in the study.

4. Exclusion Criteria:

1) Patients in Acute Medical Care Unit having infection at the time of admission
2) Infections which are not related to the procedures performed in Acute Medical Care Unit
3) Patients whose AMCU stay was less than 48 hours like post-operative and trauma patients.
4) Trained staff who did not give consent to participate in the study.
5) All staff members who were not at work place during data collection period like those in full time school schedule and those on leave.

5. Study Duration: Two Years

6. Sample Size:

All the patients admitted in AMCU from January 2013 to December2013 who required ventilator support or were on ventilator support were considered. 470 patients admitted to AMCU who needed ventilator support or the patients on ventilator support in AMCU, were considered.Total of 9300 ventilated days were considered.

The sample size for the study is calculated using Kish Leslie formula as follows

$N= Z^2 (P (1-P)/C^2$

Where: N = Sample size

Z = Standard normal deviation of 1.96 corresponding to 95% confidence interval

P= prevalence rate = 0.22, taken from a study done in South Africa[18]on knowledge of ICU nurses on prevention of VAP.

C = is a degree of accuracy of the results (marginal error), set at 0.07

IV. Methodology

Entire study was divided into four phases based on three specific objectives viz., observation, assessment, implementation and evaluation.

I. **Phase – 1**: In **observation phase**, Ventilator Associated Pneumonia rate were segregated from total infection rate and used as base of study. Also the various practices in the wards were monitored closely to understand the reasons of high infection rates.

II. **Phase –2**: The **assessment phase** included to know the knowledge status and attitude of the health care staff towards the concern subject. It was necessary to assess the real knowledge, awareness and interest of ward staff regarding the VAP and their preventive and control measures.
Different types of questionnaire were designed for various levels of staff i.e .for doctors, nurses and class IV employee etc .The consent of staff participating was obtained while collecting the information in Questionnaire.

III. **Phase – 3**: **Implementation phase** was complete by educating the healthcare staff for correcting the various wrong practices to control the Ventilator Associated Pneumonia. Required changes to reduce the Incidence of Ventilator Associated Pneumonia in AMCU were recommended. It was tried to implement the measures for control of infection in two steps:

a. **Education:** During this session it was tried to impart information firstly to the class IV employees and then to nursing staff regarding hand washing , proper waste segregation, measures of universal precautions, effects of infection on patients and their own health with the help of audiovisual communication methods. Later same interactive education programme sessions were also carried out for nursing staff and Junior doctors.
b. **Supervision:** The period of implementation was supervised particularly some of the activities that were the major source of infection .Corrective measures were implemented.

Phase –4: In **Evaluation phase** of outcome were made to observe in the changes after the strategy implementation .Results were compared with the standards and were disseminated to the people directly or indirectly involved in patient care.

Data Collection:

Data collection were from multiple sources of information as necessary like case sheets, format developed for collecting data, various Registers, Lab reports etc.

One data collection form were completed for each patient as given below and Consent will be taken in the format given below.

The information to be collected include:

- Administrative data (e.g. hospital number, admission date)
- additional information describing demographic risk factors (e.g. age, gender, severity of underlying illness, primary diagnosis, immunological status) and interventions (e.g. device exposure, surgical procedure, treatments) for infected and for non-infected patients
- Presence or absence of infection: date of onset, site of infection, microorganisms isolated, and antimicrobial susceptibility.

Questionnaire was given to Critical Care staff who were willing to participate and Pre-test before intervention and Post-Test after intervention was taken

Data Validation:

Data validation was essential to ensure correct interpretation and meaningful comparisons. Validation is a continuous process which may incorporate various methods:

- Before data input, information validated by a second extractor
- If computerized data collection is used, the software should include input checks (each variable collected must be coded according to the protocol)
- Before analysis, a retrospective data validation performed to identify missing values, inconsistencies, outliers/possible errors, unexpected values or codes.

V. Data Analysis

Analysis included the description of the population, frequency of risk exposure and infections, calculation of rates, comparisons of patient groups (with significance testing), comparisons of rates over time etc. For adequate sample size, and monitoring long-term trends, continuous surveillance or surveillance undertaken at periodic intervals of sufficient length is done .Computerization of data collection and analysis was considered, if possible, as it will ensure rapid feedback and better data quality. Information already collected and accessible through the hospital computer system should be used, wherever possible. Integration of nosocomial infection surveillance into routine data handling was encouraged by defining specific requirements for hospital information systems.

Descriptive statistics were used to interpret the demographic data: age, sex, years working in ICU and training. SPSS version 16 was the statistical programme used to analyze the data. Data received from research assistance daily then cleaned and coded by the researcher. Frequency distributions, pie chart and cross-tables were used to provide an overall and coherent presentation and description of data. Multivariate regression tests were used to express the magnitude and direction of the association between education level, years working in Critical Care, Critical Care staff training and Critical care staff' knowledge on prevention of VAP. To explore differences in care practice among AMCU, Chi-Square test was used. Summary statistics were provided as annual VAP rate (VAP cases per 1000 ventilator days) with P value. Annual percentage of compliance was compared via 95% confidence intervals. Correct choices were cycled by participants; participants who selected a correct choice from a certain item were considered to have knowledge on that item. Participants who selected wrong choice from a certain item were considered to have no knowledge on that item.

Expected Outcome

It was expected that VAP rate in AMCU will reduce in post-intervention phase as compared to pre-intervention phase. It was also expected that staff of AMCU become aware of aseptic practices to control Ventilator Associated Pneumonia and also increase knowledge related to that.

Blinding/ Masking:

No blinding can be done in this study as it is an interventional procedure.

IV. Observations And Results

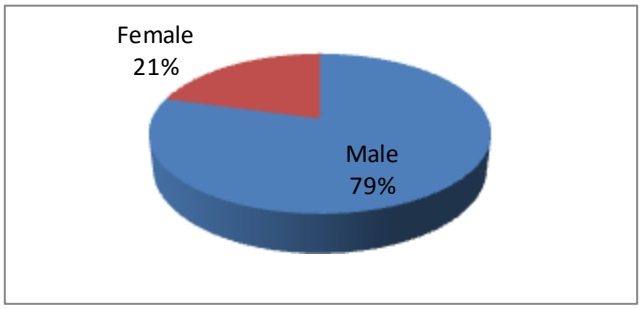
Total of 470 patients admitted in AMCU of Yashoda Hospital were put on mechanical ventilator in span of January 2013 to December 2013.470 patients had a total of 9300 ventilated days.Out of which 58 patients developed Ventilator AssociatedPneumonia (VAP).

Sex Distribution

Table 3: Sex wise distribution of VAP cases

Gender	Number of cases	Percentage (%)
Male	46	79.31
Female	12	20.69
Total	58	100

Graph 1: Sex wise distribution of VAP cases



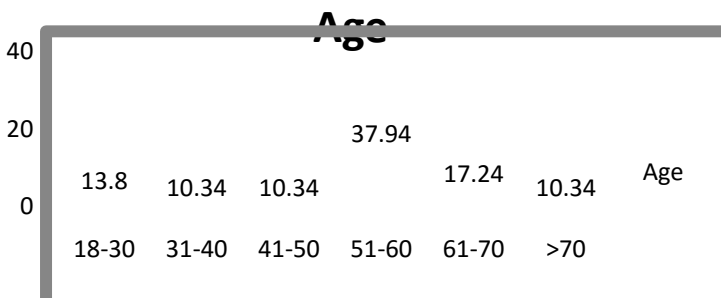
Of these 58 patients with VAP, 46 were males (79.31%) and 12 were females (20.69%).

Age Distribution

Table 4: Age wise distribution of VAP cases

Age group (in years)	Number	Percentage
18 to 30	8	13.80
31 to 40	6	10.34
41 to 50	6	10.34
51 to 60	22	37.94
61 to 70	10	17.24
>70	6	10.34
Total	58	100

Graph 2: Age wise distribution of VAP cases



Of these 58 patients with VAP,8 patients (13.80%) were between age of 18 to 30 years,6 patients (10.34%)were between 31 to 40 years,6 patients(10.34%)were between 41 to50 years,22 patients (37.94%)were

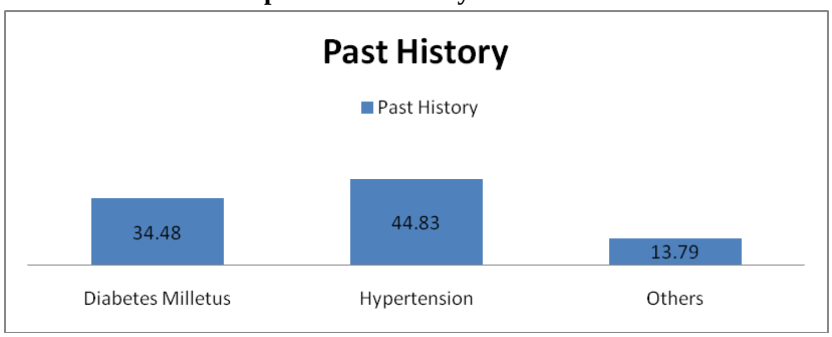
between 51 to 60 years,10 patients (17.24%) were between 61 to 70 years and 6 patients (10.34 %) were above 70 years. Maximum patients were between age group 51 to 60.

Past History

Table 5: Past History Distribution

PAST HISTORY	NUMBER OF CASES	PERCENTAGE
Diabetes mellitus	20	34.48
Hypertension	26	44.83
Others(COPD,T.B.,Asthma,Seizures)	8	13.79

Graph 3: Past History Distribution



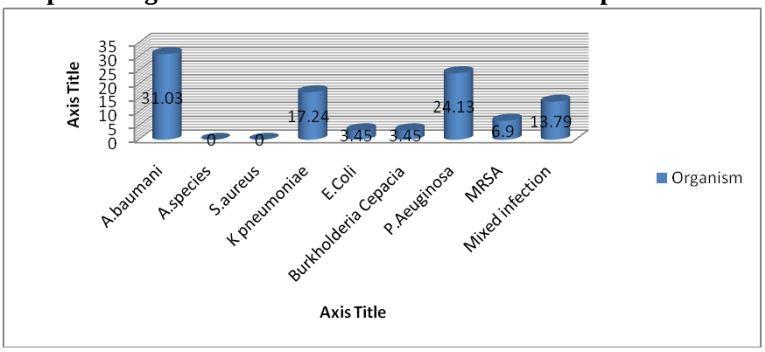
Out of 58 cases of VAP, 20 (34.48%) cases had history of DM and 26(44.83%) cases had HTN while 8(13.79%) cases had other reasons like Asthma, COPD, and Seizures etc.

Organisms Isolated From Endotracheal Aspirate Culture

Table 6: Organisms Isolated From Endotracheal Aspirate Culture

ORGANISMS	NUMBER OF CASES	PERCENTAGE
A. baumannii	18	31.03
A. species	0	0
S. aureus	0	0
Klebsiella pneumoniae	10	17.24
E. Coli	2	3.45
Burkholderia Cepacia	2	3.45
P. aeruginosa	14	24.13
MRSA	4	6.90
Mixed Infection	8	13.79
Total	58	100

Graph 4: Organisms Isolated From Endotracheal Aspirate Culture



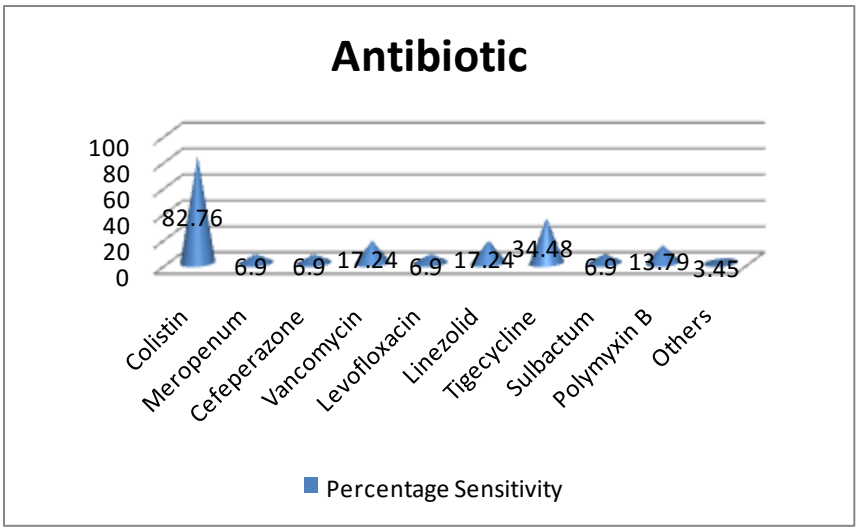
A.baumannii and P. aeruginosa were the most common organisms causing Ventilator Associated Pneumonia. Of the organisms isolated A. baumannii was isolated in18 patients and P. aeruginosa was isolated in 14 patients whoamount to 31.03% and 24.13%respectively. More than 1 organism cultured is taken as Mixed Infection

Sensitivity Pattern

Table 7: Sensitivity Pattern of Antibiotic

Sensitivity Pattern	Number of cases	Percentage
Colistin	48	82.76
Meropenum	4	6.90
Cefeperazone	4	6.90
Vancomycin	10	17.24
Levofloxacin	4	6.90
Linezolid	10	17.24
Tigecycline	20	34.48
Polymyxin B	8	13.79
Sulbactum	4	6.90
Others	2	3.45

Graph 5: Sensitivity Pattern of Antibiotic



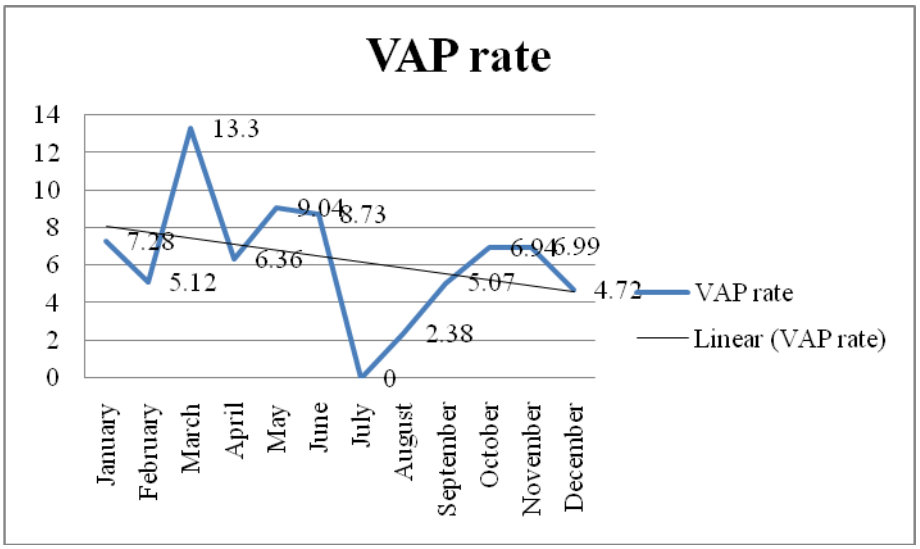
Commonest Antibiotic for which most bacteria were sensitive was Colistin (82.76%) followed by Tigecycline (34.48%).Vancomycin and Linezolid had sensitivity for 17.24% each and Polymyxin B had sensitivity for 13.79%.

MONTHWISE DISTRIBUTION OF VAP RATES

Table 8-Monthwise Distribution of VAP cases

Month	Number of VAP cases	Total Number of Device days	VAP rate per 1000 device days
January	6	824	7.28
February	4	780	5.12
March	8	600	13.3
April	4	628	6.36
May	8	884	9.04
June	8	916	8.73
July	0	760	0
August	2	840	2.38
September	4	788	5.07
October	4	576	6.94
November	6	858	6.99
December	4	846	4.72

Graph 6-Monthwise Distribution of VAP cases



There were maximum cases of VAP in March (13.3) and minimum in July (No case in July)

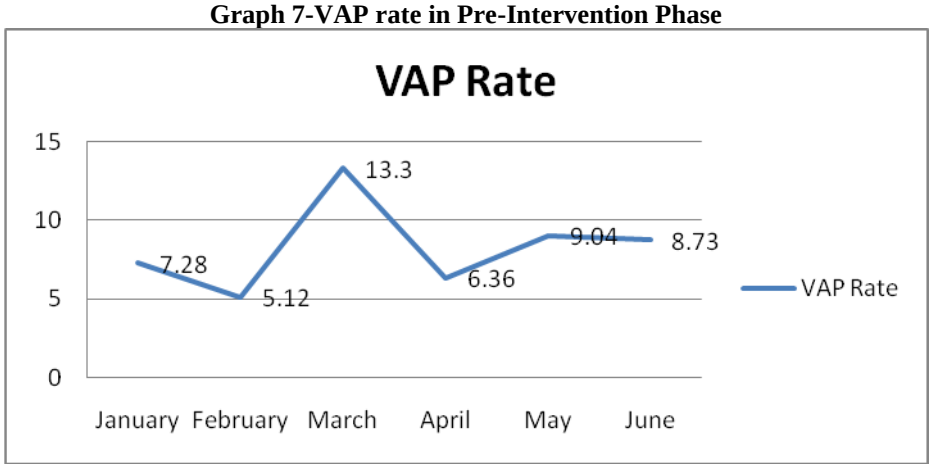
Comparison Of Vap Rates Between Preintervention Phase And Post Intervention Phase

A) Vap Rate In Pre-Intervention Phase

Table 9-VAP rate in Pre-Intervention Phase

Month	Number of VAP cases	Total Number of Device days	Vap rate per 1000 device days
January	6	824	7.28
February	4	780	5.12
March	8	600	13.3
April	4	628	6.36
May	8	884	9.04
June	8	916	8.73
Total	38	4632	Average-8.31

Graph 7-VAP rate in Pre-Intervention Phase



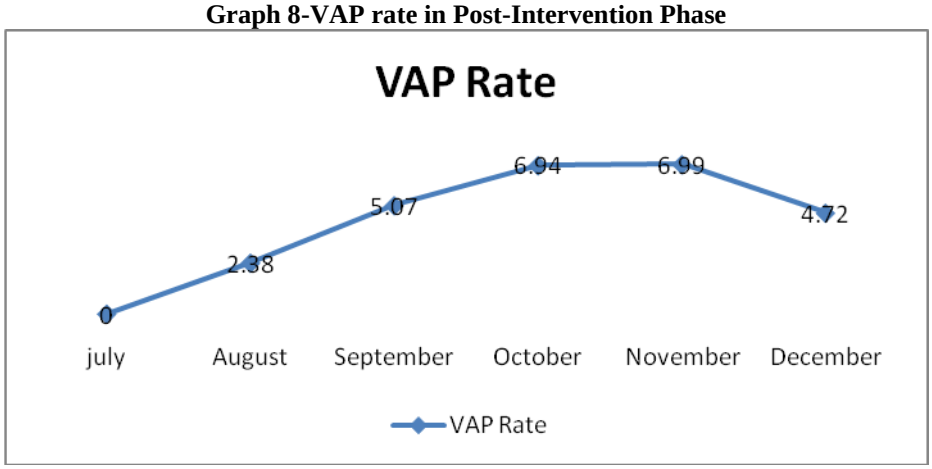
Average VAP rate in Pre intervention Phase is 8.31 per 1000 ventilator days.

B)Vap Rate In Post-Intervention Phase

Table 10-VAP rate in Post-Intervention Phase

MONTH	NUMBER OF VAP CASES	TOTAL NUMBER OF DEVICE DAYS	VAP RATE PER 1000 DEVICE DAYS
July	0	760	0
August	2	840	2.38
September	4	788	5.07
October	4	576	6.94
November	6	858	6.99
December	4	846	4.72
Total	20	4668	Average-4.35

Graph 8-VAP rate in Post-Intervention Phase



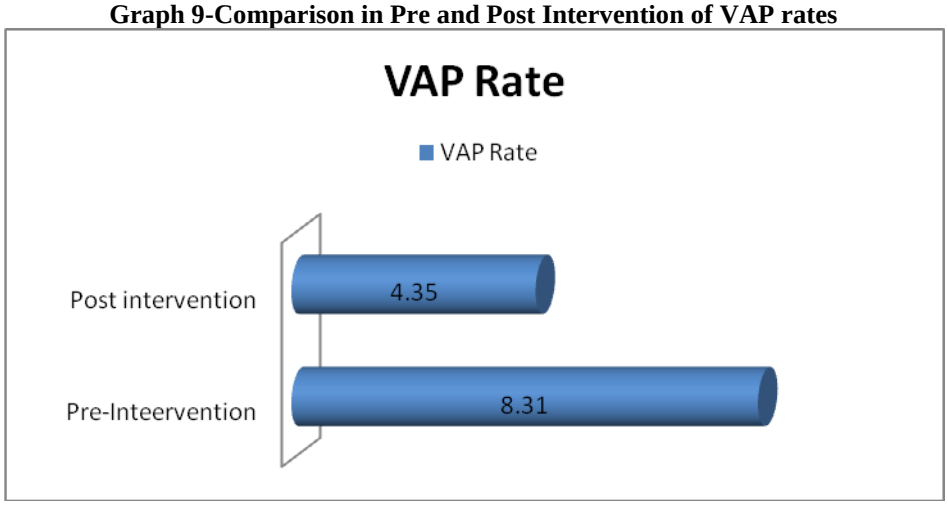
Average VAP rate in Post intervention Phase is 4.35 per 1000 ventilator days

C) Comparison Between Pre And Post Intervention Of Vap Rates

Table 11-Comparison in Pre and Post Intervention of VAP rates

Phase	Average VAP Rate (per 1000 ventilator days)
Pre Intervention	8.31
Post Intervention	4.35

Graph 9-Comparison in Pre and Post Intervention of VAP rates



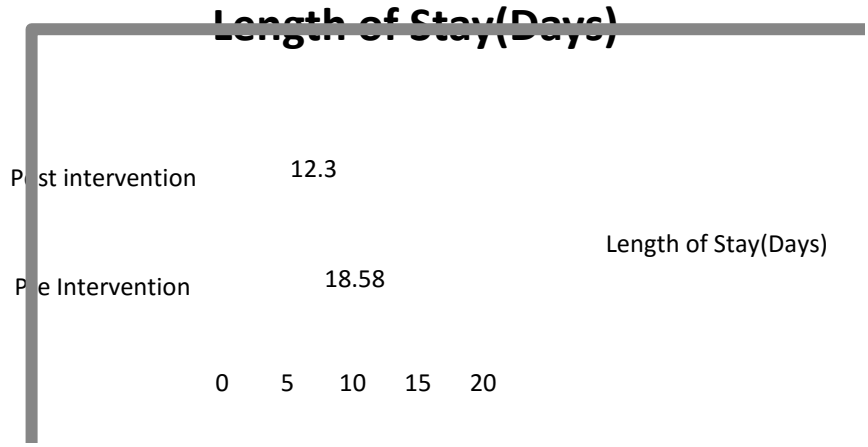
Average VAP rate reduced from 8.31 per 1000 ventilator days in Preintervention phase to 4.35per 1000 ventilator days in post intervervention phase. Hence there was reduction by 47.65 % in VAP rate. P value was <0.05.Hence it is statistically significant (T = 2.577, P=0.028).

Length Of Stay

Table 12-Comparison in Pre and Post Intervention Length of Stay

Phase	Average Length of Stay(in days)
Pre-Intervention	18.58
Post-Intervention	12.30

Graph 10-Comparison in Pre and Post Intervention Length of Stay



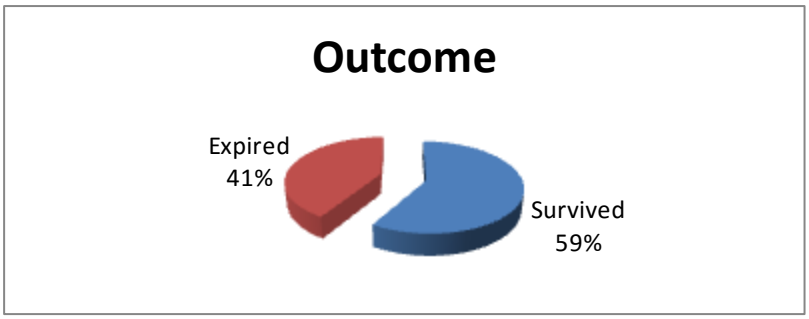
Average Length of Stay reduced from 18.58 days in Preintervention phase to 12.30days in post intervervention phase. Hence there is reduction by 33.80 % in Length of Stay . P value is <0.05.Hence it is statistically significant(T = 2.267, P=0.027).

Outcome Of Patients

Table 13-Outcome of Patients

Outcome	Number	Percentage
Expired	24	41.38
Survived	34	58.62

Graph 11- Outcome of Patients



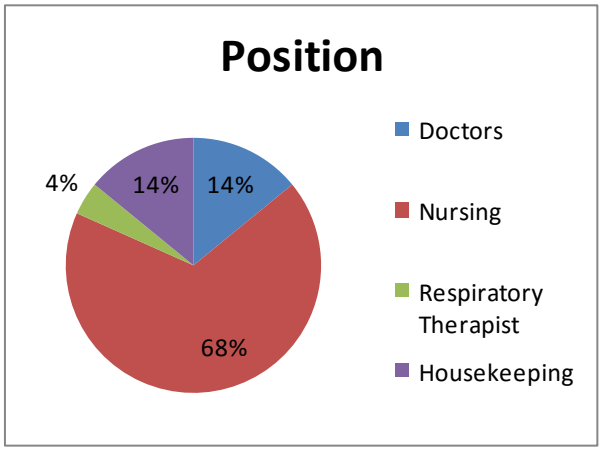
Out of total 58 patients 38 patients (58.62%) survivedwhile 20patients (41.38%) patients expired

Distribution Of Participant On Basis Of Position

Table 14-Distribution of Participants on basis of Position

Position	Number of participant	Percentage
Doctors	10	14.08
Nursing	48	67.61
Respiratory Therapist	3	4.23
Housekeeping	10	14.08
Total	71	100

Graph 12-Distribution of Participants on basis of Position



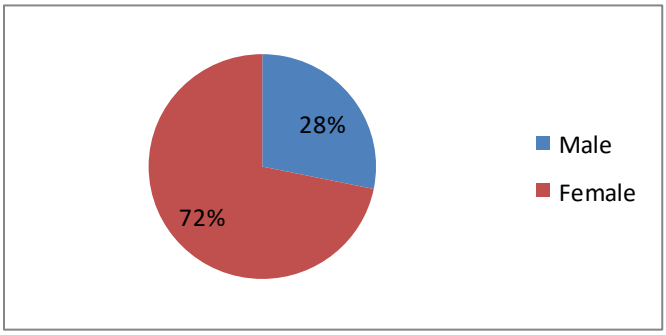
Total of 71 participants from different positions viz Doctors,Nursing,Housekeeping,Respiratory Therapist and who were willing to participate were selected.48 (67.61%) were nursing staff,10(14.08%) were doctors,3(4.23%) were respiratory therapist and 10 (14.08%) were housekeeping staff.

Demographic Characteristics Of Participant On Basis Of Gender

Table 15-Demographic Characteristics of Participants on basis of gander

Gender	Number	Percentage
Male	20	28.17
Female	51	71.83

Graph 13- Demographic Characteristics of Participants on basis of gander



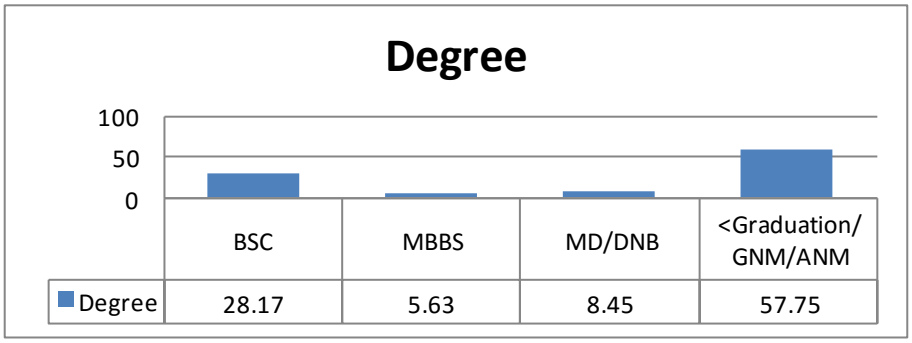
Female participants in the study group accounted for 71.83%% (n=51) and male Participant accounted for 28.17 % (n=20).

Distribution Of Participant On Basis Of Education Level

Table 16-Distribution of Participants on basis of Educational Level

Education Level	Number	Percentage
Bachelors (BSC)	20	28.17
MBBS	4	5.63
MD/DNB	6	8.45
<Graduation/GNM/ANM	41	57.75
Total	71	100

Graph 14- Distribution of Participants on basis of Educational Level



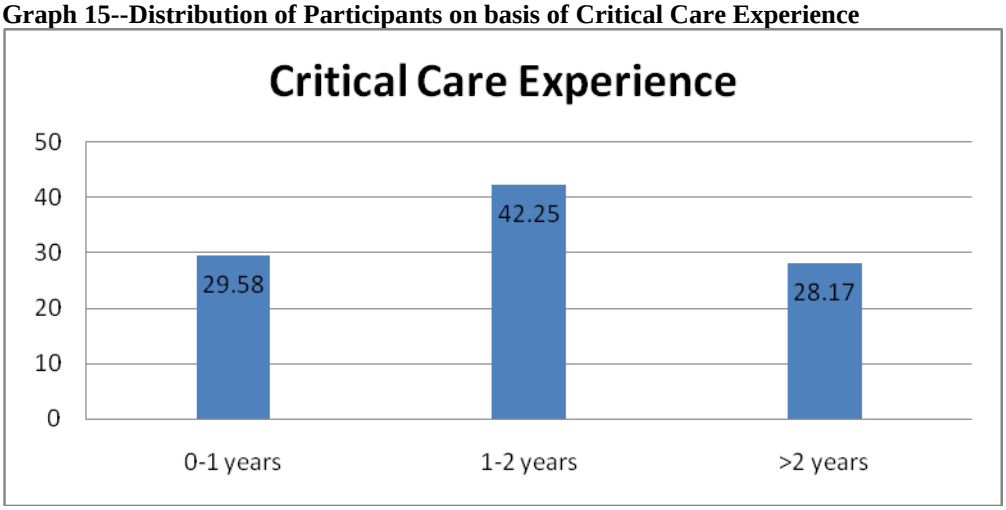
Of the 71 participants, 20 (28.17%) participants had BSC degree, 4 (5.63%) participants had MBBS degree,6 (8.45%) participants had MD/DNB degree and 41(57.75%) had <graduation/GNM/ANM degree. It was found that increase in score was statistically not significant with education level as P value is not <0.05(P=0.28).

Distribution Of Participant On Basis Of Critical Care Experience

Table 17-Distribution of Participants on basis of Critical Care Experience

Critical Care Experience	Number	Percentage
0-1 years	21	29.58
1-2 years	30	42.25
>2 years	20	28.17
Total	71	100

Graph 15--Distribution of Participants on basis of Critical Care Experience



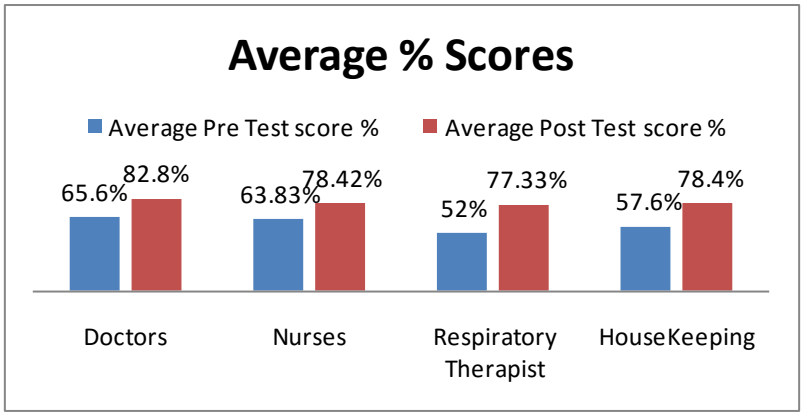
Years of experience in ICU also varied greatly among participants. There was an average of 1-2years Critical Care experience among 30 (42.25%). 20 (28.17%) had over two years of Critical Care experience. 21 (29.58%) had at least six months (but less than one year experience in Critical Care. It was found that increase in score was found statistically not significant to critical care experience as P value is not <0.05(P=0.62).

Descriptive Statistics Score Of Knowledge For Prevention Of Vap

Table 18-Knowledge For Prevention of VAP

Category of staff	Average Pre-test Score	Average Pre-Test(%)	Average Post-Test Score	Average Post-Test %
Doctors	16.40	65.60	20.70	82.80
Nursing	15.94	63.83	19.60	78.42
Respiratory Therapist	13	52	19.33	77.33
Housekeeping	14.40	57.60	19.6	78.40

Graph 16- Average Individual Staff Percentage of Knowledge For Prevention of VAP



Graph 17-Average Individual Staff Score of Knowledge of Prevention of VAP

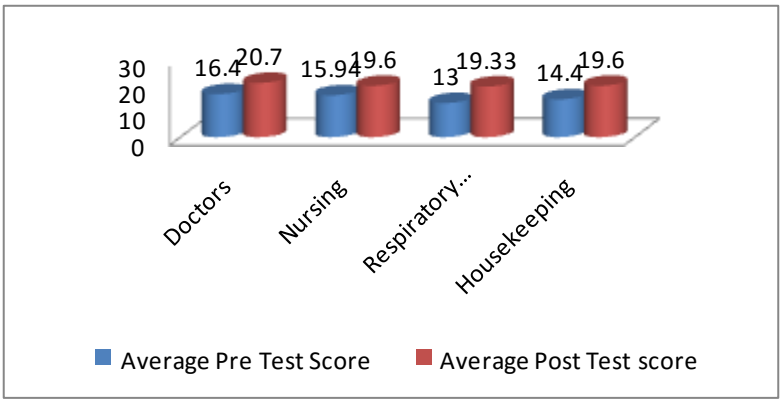


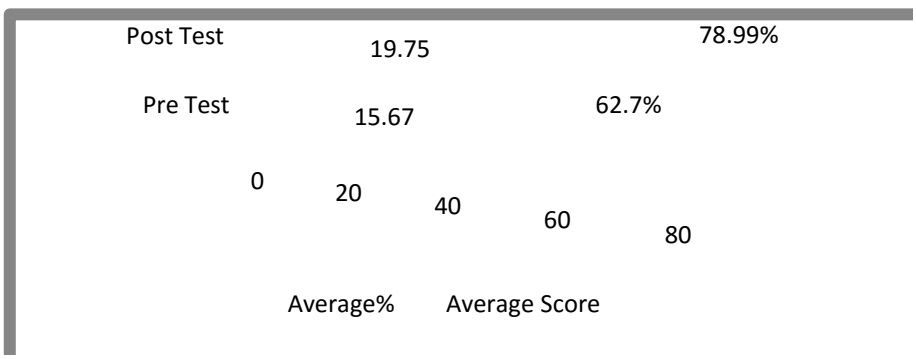
Table 19- Pre-Test Score and Post-Test Score Mean

Characteristics	Mean+S.D	Mean	Mode	Range
Pre Test	74	62.70	68	32-84
Post Test	87.96	78.99	76	56-96

Table 20-Average Pre Test and Post Test Score

Phase	Average Score	Average Percentage
Pre-Test	15.67	62.70
Post-Test	19.75	78.99

Graph 18-Average Pre-Test and Post Test Score



There was a increase in knowledge score from 15.67(62.70%) in Pre-Test to 19.75(78.99%) in Post-Test. Hence there is 16.29% rise in score. It was found to be**highly statistically significant** as P =<0.01. (T=9.48,P=0.000).

Compliance With Preventive Practices

A) Handwashing Compliance

Table 21- Pre test Hand washing Compliance

Staff	Opportunity	Actions	Compliance
Doctors	70	29	41.40
Nursing	330	162	49
Respiratory Therapist	32	8	25
Housekeeping	60	11	18.30
			Average-33

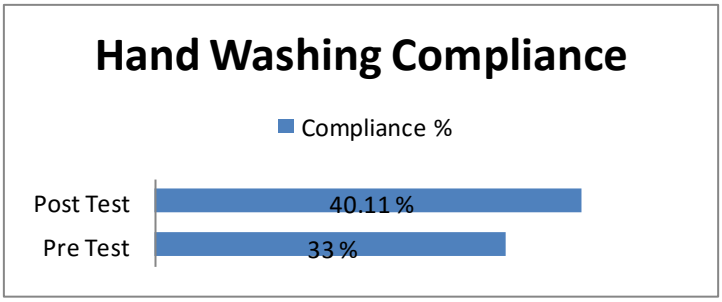
Table 22-Post Test Hand washing Compliance

Staff	Opportunity	Actions	Compliance
Doctors	154	74	46.84
Nursing	238	128	53.78
Respiratory Therapist	50	15	30
Housekeeping	77	23	29.8
			Average-40.11

Table23-Comparison of Pre Test and Post Test Handwashing Compliance

	Pre-Test Compliance	Post Test Compliance
Compliance %	33	40.11

Graph 19-Comparison of Pre-Test and Post Test Hand washing Compliance



Hand washing Compliance improved from 33% in Pre test to 40.11 % in post test intervention. Hence there was increase in 7.11%.

B)Compliance With Oral Care

Table 24-Pre test Compliance with oral care

Staff	Compliance %
Doctors	74.80
Nursing	81.90
Respiratory Therapist	80.30
Housekeeping	76.20
	Average-78.30

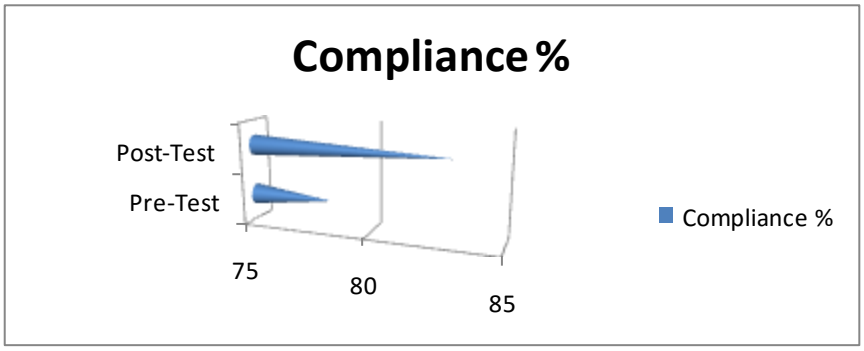
Table 25-Post Test Compliance with oral care

Staff	Compliance %
Doctors	79.60
Nursing	90.50
Respiratory Therapist	82.10
Housekeeping	80.20
	Average-83.10

Table 26-Comparison of Pre Test and Post Test Compliance with oral care

	Pre-Test Compliance%	Post –Test Compliance %
Compliance %	78.30	83.10

Graph 20-Comparison of Pre-Test and post-test Compliance with oral care



Compliance with Oral care improved from 78.30% in Pre-test to 83.10 % in Post Test. Hence there was increase in 4.8%.

C)Compliance With Ventilator Bundle

Table 27-Pre-Test Comparison with Ventilator Bundle

Staff	Compliance %
Doctors	88.23
Nursing	84.10
Respiratory Therapist	88.37
Housekeeping	86.10
	Average-86.70

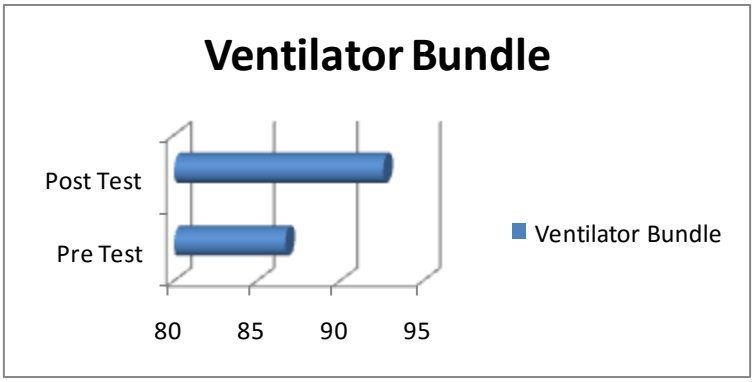
Table 28-Post Test Compliance with Ventilator Bundle

Staff	Compliance %
Doctors	94.10
Nursing	89.60
Respiratory Therapist	92.40
Housekeeping	94.30
	Average-92.60

Table 29-Comparison of Pre Test and Post Test Compliance with Ventilator Bundle

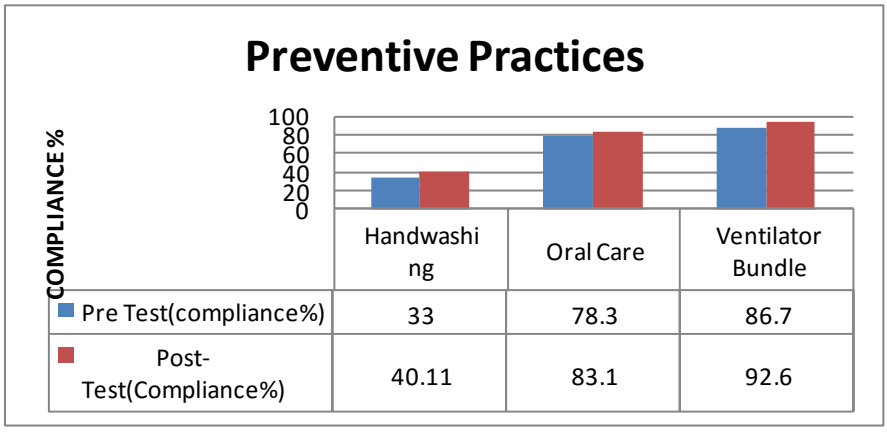
Compliance %	Pre-Test Compliance %	Post-test Compliance %
	86.70	92.60

Graph 21-Compliance of Pre-Test and Post-Test Compliance with Ventilator Bundle



Compliance with Ventilator Bundle improved from 86.70% in Pre-Test to 92.60% in Post-Test. Hence there was increase in 5.9%.

Graph 22- Comparison of Pre Test and Post Test Compliance with Preventive Practices



Preventive Practices compliance improved from 33 % to 40.11 % in hand washing, 78.30% to 83.10 % in oral care and 86.70 % to 92.60% in ventilator bundle.

V. Conclusion

Ventilator associated pneumonia is a current problem in intensive care units that increasesmorbidity and mortality amongst critically ill patients. However it is a problem that can beprevented if only intensive care staffs, especially AMCU doctors, nurses, who are next to the patient's bedside 24 hours a day, are aware of existent measures to prevent such complication.Adherence to guidelines that have proven to decrease the incidence of ventilator associatedpneumonia is extremely important to allow minimal complications and increase positive outcomes to patients and families.The positive results obtained in this study lend support to the CDC's recommendations to reinforce training to improve adherence to VAP preventive strategies. Staff working at critical unit are having knowledge gap to be able to prevent incidence of VAP among ventilated patients. Training activities and evidence-based protocols aimed at AMCU staff, improving the care quality and narrowing the gap between scientific knowledge and actual performance. The training programme improved AMCU staffs' theoretical knowledge and adherence to VAP preventive measures. Retention of knowledge is still an issue and needs further investigation if there is a change in staffs 'practice and decrease in the incidence of VAP. It should be pointed out that information obtained from the two questionnaires clearly shows that staffs' scientific knowledge is not necessarily applied in daily practice, which justifies the need of training strategies to reinforce adherence to preventive measures against VAP.The correlation between critical care experience and knowledge levels was clinically not significant and therefore this indicates that working for longer periods in critical care does not necessarily mean that one gains knowledge.

A new line of research should look into the reasons why AMCU staffs do not put into clinical practice the measures they know are important. It would be worthy to explore the factors affecting retention of knowledge. Studies focusing on attitudinal change seem to be an important area of research. A change in professional practice will only be possible through in depth.Knowledge of the reasons for non-adherence to these guidelines. Moreover, staffs own motivation towards availing opportunities for learning, through attending continuing education sessions needs to be explored.

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