

**ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES
DEPARTMENT OF INTERNAL MEDICINE, ADDIS ABABA, ETHIOPIA.**



**ASSESSMENT OF KNOWLEDGE AND PRACTICE OF ICU CARE BUNDLES
IN INFECTION CONTROL AMONG PHYSICIANS AND NURSES WORKING
IN THREE GOVERNMENT HOSPITALS (TIKUR ANBESA SPECIALIZED
HOSPITAL (TASH), YEKATIT 12 AND ST. PETER SPECIALIZED
HOSPITAL) ADULT ICU, ETHIOPIA, 2021.**

PRINCIPAL INVESTIGATOR: MULUGETA TESHOME (IMR3)

**A THESIS TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY, DEPARTMENT OF
INTERNAL MEDICINE AS A REQUIREMENT FOR THE PARTIAL FULFILLMENT OF
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AAU, ADDIS ABABA, ETHIOPIA

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ACRONYMS

- CAUTI- catheter-associated urinary tract infections
- CDC- Centers for Disease Control and Prevention
- CLABSI- central line associated blood stream infections
- EBGs- evidence-based guidelines
- HAI's- Hospital acquired infections
- HCAI- Health care associated infection
- ICU- Intensive care unit
- INICC- International Nosocomial Infection Control Consortium
- NEJM- New England journal of medicine
- SPSS- Statistical package for Social Sciences
- TASH- Tikur Anbessa Specialized hospital
- VAP- Ventilator-associated pneumonia
- WHO- World Health Organization

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ABSTRACT

BACKGROUND: Intensive care is a continuum of care from various source of admissions where patients' requiring a frequent evaluation and support to assure safe and effective outcomes. Mortality in intensive care unit (ICU) is a global burden which results in a huge loss of productivity and financial costs. In Africa, the ICU mortality rate is high compared to developed continents. "Evidence-Based Bundle" of care which involves 3–5 structured interventions help to reduce and prevent hospital acquired infections (HAI's).

OBJECTIVE: To assess the knowledge and practice of ICU care bundles among physicians and nurses working in three government hospitals Adult ICU, Addis Ababa, Ethiopia 2021.

METHODS: A cross-sectional descriptive study was conducted using a structured questionnaire and observational check list. Proportional sampling technique was used. Collected data was cleaned, coded and entered in to excel and SPSS version 26 was used for analysis and descriptive methods such as frequencies, or proportions. A score of $\geq 60\%$ is considered as knowledgeable or good practice. χ^2 tests were used to look for association with $P < 0.05$.

RESULT: A total of 101 health professionals participated with the response rate of 96.2%. Of this 53 (52.5%) were nurses and 48 (47.3%) were physicians, majority 55 (54.5%) were from TASH, 64.4% of them were males and the mean age of respondents was 29.4 (SD $\pm$ 3.32) years. Regarding knowledge of ICU care bundles, 53 (52.5%), 69 (68.3%) and 79 (78.2%) were knowledgeable regarding VAP, sepsis and urinary catheter care bundle respectively. But 50 (49.5%), 64 (63.4%) and 68 (67.3%) were observed to have good practice of elements of VAP, sepsis and urinary catheter care bundles in their daily activity respectively. This study also showed that there is significant association between knowledge and practices ($p < 0.001$).

DISCUSSION AND CONCLUSION: Even through nurses' and physicians' overall knowledge regarding ICU care bundles was good, the practice was inadequate and the health care workers do not implement the latest evidenced based bundle practices. So the overall knowledge and practice of ICU care bundles used for prevention of ICU infection was suboptimal.

Keywords: Knowledge, practice, ICU care bundles, sepsis, ventilator-associated pneumonia, urinary catheter care.

CHAPTER 1: INTRODUCTION

1.1.BACKGROUND

Intensive care is a continuum of care from various source of admissions such as trauma unit, emergency department, inpatient wards, and post anesthesia care unit where patients' requiring a frequent assessment of vital signs, invasive hemodynamic monitoring, intravenous medications and fluid management, ventilatory and nutritional support to assure safe and effective outcomes (1). Access to critical care is a crucial component of healthcare systems hence critically ill patients are admitted to the intensive care units (ICU) to reduce morbidity and mortality associated with acute illness, trauma or surgical procedures (2, 3).

Hospital acquired infections (HAI's) are considered major public health risks and leading causes of death in hospitalized patients. According to the Centers for Disease Control and Prevention (CDC), HAIs defined as infections localized or systemic condition resulting from adverse reaction to the presence of infectious agent or its toxins acquired from health care settings that was not incubating or symptomatic at the time of admission to the healthcare facility (4).

According to the World Health Organization (WHO) national and multicenter literature review, the prevalence of acquiring at least one Health care associated infection (HCAI) ranges from 3.5% to 12% among high income countries. In developing countries, the problem reaches up to three times higher compared to the incidence seen in adult intensive care units in USA (5). 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 HAIs. At any time, over 1.4 million people worldwide suffer from infectious complications acquired in hospital (6).

The burden of HAIs is more in the developing countries, with highest prevalence in the intensive care units (ICUs). A prospective, multicentric, and cohort surveillance study of device associated infection as conducted by International Nosocomial Infection Control Consortium (INICC) in 55 ICUs of 8 developing countries including India revealed the overall rate of 14.7% HAIs corresponding to 22.5 infections/1000 ICU days [7].

In 2007, the INICC conducted prospective surveillance from 12 ICUs in 7 different cities showed that the overall HAI incidence rate of 4.4% (9.06 infections per 1000 ICU days) (8).

The burden of HAIs in Ethiopia as well as in many developing countries has been reported to be higher because of the large number of patients, limited number of staff, and insufficient compliance with infection prevention and control measures [9].

Mortality in ICU is a global burden which results in a huge loss of productivity and financial costs. It varies across the world depend on ICU infrastructure, staff availability, and training, pattern, and cause of ICU admission. In developed continents like North America, Oceania, Asia and Europe in ICU mortality relatively low with the rate of 9.3%, 10.3, 13.7% and 18.7% respectively, while in the rest of the world such as South America, and the Middle East the mortality found to be 21.7% and 26.2% (10, 11).

In Africa, the ICU mortality rate is high as it compared to the other developed continents. The mortality rate in Nigeria, Uganda, Tanzania, and Kenya were 32.9%, 40.1%, 41.1%, and 53.6% respectively (11, 12, 13).

“Evidence-Based Bundle” of care, a concept developed by the Institute for Healthcare Improvement(IHI) usually involves 3–5 structured interventions based on scientific evidence, which when carried out consistently improve patient outcomes. Many of these “Bundles” have focused on reduction and prevention of HAI’s (Ventilatory associated pneumonia (VAP), central line associated blood stream infections (CLABSI), sepsis), which are considered preventable (14, 15, 16).

The professional practice in a high risk critical care setting requires specialized knowledge, advanced skills, clinical experience and problem solving abilities to assess monitor and effectively respond to the needs of critically ill patients. In addition, critical care nurses’ knowledge of adherence to and practice toward evidence-based guidelines (EBGs) to prevent VAP has been inadequate. Gaps between knowledge and actual clinical practice have not been sufficiently studied and needs further research which will contribute to the quality of care and improvement of critical patient’s outcome. Therefore it is important to evaluate intensive care nurse’s knowledge and practice to highlight possible contributors and barriers to the implementation of preventive measure on prevention of ventilator associated pneumonia, which is what this study is aiming to achieve.

1.2. STATEMENT OF THE PROBLEM

Patients in intensive care units (ICUs) are a significant subgroup of all hospitalized patients, accounting for about 25% of all hospital infections. According to World Health Organization (WHO), of every 100 hospitalized patients, 10 in developing countries and 7 in developed countries will acquire at least one HAI (8).

The CDC also estimates that 2 million patients suffer from HAIs every year and nearly 100,000 of them die in United States (US). In US and Europe the point prevalence of patients with at least one HAI in acute care hospitals has reached 6%, prevalence (19.5%) was highest among patients admitted to ICU. By contrast in developing countries, the problem is three times higher when compared to the incidence observed in adult intensive care units in the US. It is also thought that the prevalence is more than 40% in parts of Asia, Latin America and sub-Saharan Africa. In sub-Saharan Africa alone, the rate of HAIs ranges from 2.5 to 30.9% with patients undergoing surgery, the most frequently affected (17).

The prevalence of ICU acquired infections is significantly higher in developing countries than in industrialized countries, varying between 4.4% and 88.9%. Furthermore, device associated infection rates in developing countries, especially ventilator associated pneumonia (VAP) followed by central venous catheter related bloodstream infections (CRBSIs), occur at a higher frequency than in European countries and USA (8, 18).

The incidence of device associated infections in critically ill patients was found to be from 2-19 fold higher in low and middle low-income countries compared to the USA and Germany. VAP is a serious problem that is associated with high mortality rates and increased in ICU length of stay, which may represent an additional burden on the scarce resources in developing countries (17).

The major problems associated with increased nosocomial infections in these countries are low compliance of hand hygiene, excessive number of patients and workload, inadequate staff and personal protective equipment, and late establishment of infection control programs (14).

Increasing drug resistance and the spreading of multi drug resistant (MDR) pathogens in the ICU environment, results in limited therapeutic options and prolonged hospitalization. Consequently, ICU acquired infections have been associated with significant morbidity, mortality and rising healthcare costs in developing countries with limited resources (16, 17).

The professional practice in a high risk critical care setting requires specialized knowledge, advanced skills, clinical experience and problem solving abilities to assess monitor and effectively respond to the needs of critically ill patients. In addition, critical care nurses' and physicians knowledge of adherence to and practice toward evidence-based guidelines (EBGs) to prevent ICU infection has been inadequate. Gaps between knowledge and actual clinical practice on the use of ICU care bundles have not been sufficiently studied and needs further research which will contribute to the quality of care and improvement of critical patient's outcome. Therefore it is important to evaluate knowledge and practice of ICU care bundles in infection control among physicians and nurses, which is what this study is aiming to achieve.

1.3. SIGNIFICANCE OF THE STUDY

Since adherence to components of standard precautions against HCAs and improving knowledge and practice of ICU care bundles have been found to be effective in reducing the ICU related infections.

The findings of this study will be used as baseline or supplementary data for hospital administration, health authorities and policy makers to improve quality of intensive care unit service.

This study will serve as a reference for further researches related to this topic.

1.4. RESEARCH QUESTIONS

1. What is the knowledge of nurses and physicians working in the intensive care unit about ICU care bundles?
2. What is the practice of nurse and physicians working in the ICU about ICU care bundles?

CHAPTER 2: LITERATURE REVIEW AND CONCEPTUAL FRAME WORK

2.1. LITERATURE REVIEW

2.1.1. ICU morbidity and mortality due to HAI

The burden of HAIs is more in the developing countries, with highest prevalence in the intensive care units (ICUs). In 2007, the INICC conducted prospective surveillance from 12 ICUs in 7 different cities showed that the overall HAI incidence rate of 4.4% (9.06 infections per 1000 ICU days) (8).

“Evidence-Based Bundle” of care have focused on reduction and prevention of HAI’s (VAP, CLABSI, sepsis), which are considered preventable, as demonstrated in the landmark NEJM article describing the outcome of the Michigan Keystone ICU Patient Safety Program, which resulted in a large (66 %) and sustained decrease rate of catheter related blood stream infections from 7.7 per 1,000 to 1.3 per 1,000 catheter days (14, 15, 16).

VAP is a type of nosocomial pneumonia that occurs 48–72 hours or thereafter following endotracheal intubation. It is the most frequent type of device-associated infection diagnosed in developing countries and has been firmly associated with an increased mortality, a longer hospital stay and additional healthcare costs. Mortality of patients who develop VAP is increased by an average of 9 % with all-cause mortality of up to 50 % and a substantial added cost to the health care system (17).

Aspiration is the primary routes of transmissions of pathogens from the upper respiratory systems to the lower respiratory tract; since the tube is located in the trachea. Bacterial colonization of the lower respiratory tract is characterized by the absence/weak cough reflex and mucus secretions in patients on ventilation. In addition to this, a cross contamination in the ICU is the major causes of ventilator associated pneumonia in critical/ intensive care patients. The incidence of VAP depends on the duration of mechanical ventilation (IR of 3% in the first five days, then 2% in the next 6-10 days, and 1% after ten days) and it is a complication in 28% of patients on mechanical ventilation. About 63% of patients admitted to ICU had oral colonization with pathogens. Hospital stay dramatically increases mortality rates and risks. But, early detection (diagnosis) and management may contribute to lower the incidence (7, 14, 19, 20).

Sepsis is the 10th leading cause of death in the United States, with approximately 750,000 new cases diagnosed per year. Sepsis causes major health care problems in the United States, resulting in long hospitalizations, complications, and even patient death with high mortality rates as 20 to 50 percent in 2009 (38).

Surviving Septic Campaign (SSC) Guideline is designed to improve patient outcomes by combining effective component therapies in the care of septic patients and represents current best practice. Sepsis bundles have been associated with significant increase in survival and a decrease in the time on antibiotics and more appropriate antibiotic choices. The efficacy of this guideline remains dependent on the early recognition of and, intervention in, a septic patient (25).

CAUTI is defined as a urinary tract infection (significant bacteriuria plus symptoms and/or signs attributable to the urinary tract with no other identifiable source) in a patient with current urinary tract catheterization or who has been catheterized in the past 48 hours. It is the most common healthcare associated infection worldwide, resulting in increased costs, hospital stays, and substantial morbidity (31).

The majority of cases are considered to be avoidable with the implementation of infection prevention bundles of care. There are a number of strategies with varying levels of evidence to prevent CAUTI before and after placement of urinary catheters. These generally include appropriate use, aseptic insertion and maintenance, early removal, and hand hygiene (32).

2.1.2. ICU care bundles elements important in infection control

VAP Bundle

Beside the treatment of VAP different prevention methods i.e. VAP-bundle and the implementation of the International Nosocomial Infection Control Consortium multidimensional approach for VAP has been implemented and showed good improvement(14).

Elements that are generally incorporated into VAP bundles include: elevation of the head of the bed, daily “sedation vacations” and assessment of readiness to extubate, stress ulcer prophylaxis, deep venous thrombosis prophylaxis and daily oral care with chlorhexidine (14, 21).

Sepsis bundle

Key elements of the Sepsis Bundle include the following:

To be completed within 1 h:

1. Measure lactate level
2. Obtain blood culture prior to administration of antibiotics
3. Administer broad spectrum antibiotics- Within 1 h of recognition of septic shock
4. Administer 30 ml/kg crystalloid for hypotension or lactate (≥ 4 mmol/l)

To be completed within 6 h:

1. Apply vasopressors (for hypotension that does not respond to the initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥ 65 mmHg
2. In the event of persistent arterial hypotension despite volume resuscitation (Septic shock) or initial lactate ≥ 4 mmol/l:
 - a. Measure central venous pressure (CVP)—target ≥ 8 mmHg
 - b. Measure central venous oxygen saturation (Scvo2)—target ≥ 70 % and normalization of lactate
3. Re-measure lactate if initial lactate was elevated (25, 26, 27)

Urinary catheter care bundle

Recently, a large study in the United States demonstrated that a simple intervention comprising three components reduced catheter use and CAUTI rates in non-ICU acute care settings:

1. Avoiding the use of urinary catheters by considering alternative methods for urine collection.
 - Methods include: condom catheters, intermittent catheterization, use of nappies.
2. Using an aseptic technique for insertion and proper maintenance after insertion.
 - Following evidence-based guidelines and implementing catheter insertion policies at the institution.
3. Daily assessment of the presence and need for indwelling urinary catheters.
 - Indications for urinary catheterization include:
 - Urinary retention (mechanical obstruction or neuropathic).
 - Need to closely monitor urine output in unstable patients.
 - To assist perineal wound care. (31, 32)

2.1.3. Knowledge and practice ICU care bundles important in infection control

VAP Bundle

Study done in India showed that more than half (56.7%) of the staff nurses had excellent knowledge regarding ventilator care bundle and 43.3% of them had good knowledge regarding ventilator care bundle. It shows that knowledge and compliance of staff nurses regarding ventilator care bundle were found to have significant association (22).

Study done in Tanzania showed that the mean knowledge score was 38.6% which is lower than the lowest ever reported knowledge score for EBGs for VAP prevention. Nurses with a degree or higher level of nursing education performed significantly better than the nurses with a diploma or lower level of nursing education ($p=0.004$). The mean self-reported adherence score for EBGs for the prevention of VAP was 60.8%. The main barriers to the implementation of EBGs for VAP prevention were lack of skills (96.6%), lack of adequate staff (95.5%), and lack of knowledge (79.3%) (23).

Study done in selected governmental hospitals in Addis Ababa showed that most of the studied sample 60.7% had satisfactory level of knowledge and 53.3% had Good level of practice regarding VAP prevention measures with a total mean score of (15.97 ± 3.23) and (15.47 ± 2.029) respectively. Significant association was found in knowledge between participants with different education level as found ($p = 0.0041$), age groups ($p = 0.008$), sex of participant ($p=0.023$) and between participants with different years of ICU working experience ($p < 0.001$). No significant association was found regarding nurses' practice ($p > 0.05$) except sex was found ($p=0.010$) (24).

Sepsis bundle

Study at Al-Muthanna City showed that that (70%) don't have knowledge regarding six sepsis pathways). There is no significant relationship between the demographic characteristics of the study sample, ages and gender and marital status and the health care provider knowledge. While the education level and job description show a significant relationship a t P-value equal or less than (0.05) (28).

The Canadian study showed that majority of nurses scored poorly on questions examining knowledge of systemic inflammatory response syndrome variables associated with sepsis, and sepsis definitions, general knowledge, and treatment (mean score 51.8%). Nurses acknowledged

their lack of knowledge and indicated a desire for further sepsis education. Challenges in providing sepsis-related care concerned perceived heavy workloads and clinical implications related to the patient's status (29).

A Multicenter Survey done in Turkey showed of total 131 (59%) declared that they have enough knowledge on sepsis management. About the most important approach in sepsis, 151 (68%) voted for fluid replacement while 59 (26%) and 13 (6%) said early antibiotic use and inotropic support are the most important approaches respectively.

Physicians from ER (56.5%) and anaesthesiology departments (55.4%) were more aware of the fluid replacement element of the bundle (30ml/kg, 3-hours bundle) in severe sepsis. The ID physicians, who routinely follow sepsis patients, were not aware of the fluid resuscitation (only 20% replied the element correctly) but almost all of them answered the question on early antibiotic use and blood culture sampling correctly. The knowledge of target CVP and MAP in severe sepsis were also below expectant among ID physicians. The overall knowledge of sepsis bundles of internal medicine physicians was poor. Almost all of the ER physicians knew that they have to measure lactate level upon admission but they were not aware of the threshold of the lactate level (30).

Urinary catheter care bundle

The study conducted in a tertiary care multispecialty hospital in southern India among 108 staff nurses showed majority 89 (82.4%) of the participants had average knowledge, 18 (16.7%) had good knowledge on prevention of catheter associated urinary tract infections. There was maximum noncompliance to the procedural steps while performing urine specimen collection, removal of urinary catheter and maintenance of urinary catheter (33).

CAUTI prevention practices commonly followed included wearing gloves (97%), hand washing (89%), maintaining a sterile barrier (81%), and using a no-touch insertion technique (73%). Silver-coated catheters were used to varying degrees in 59% of the hospitals; 4% reported never using a catheter securing device. Urethral meatal care was provided daily by 43% of hospitals and more frequently that that by 41% of hospitals.

Nurses were the most frequently reported IUC inserters. Training in aseptic technique and CAUTI prevention at the time of initial nursing hire was provided by 64% of hospitals;

however, only 47% annually validated competency in IUC insertion. Systems for IUC removal were implemented in 56% of hospitals. IUC documentation and routine CAUTI surveillance practices varied widely (34).

Study done in Nepal showed that most of the nurses 59.37% had a moderate level of knowledge and 58.12% of nurses had a negative attitude while only 41.88% had a positive attitude and most of the nurses 64.38% had a good level of practice. Also, age ($p=0.022$), professional qualification ($p=0.001$), designation ($p=0.001$), current area of practice ($p=0.030$), and previous information towards CAUTI prevention ($p=0.003$) among all the socio-demographic variables were statistically significant with the level of knowledge regarding the prevention of CAUTI(35).

2.2. CONCEPTUAL FRAMEWORK

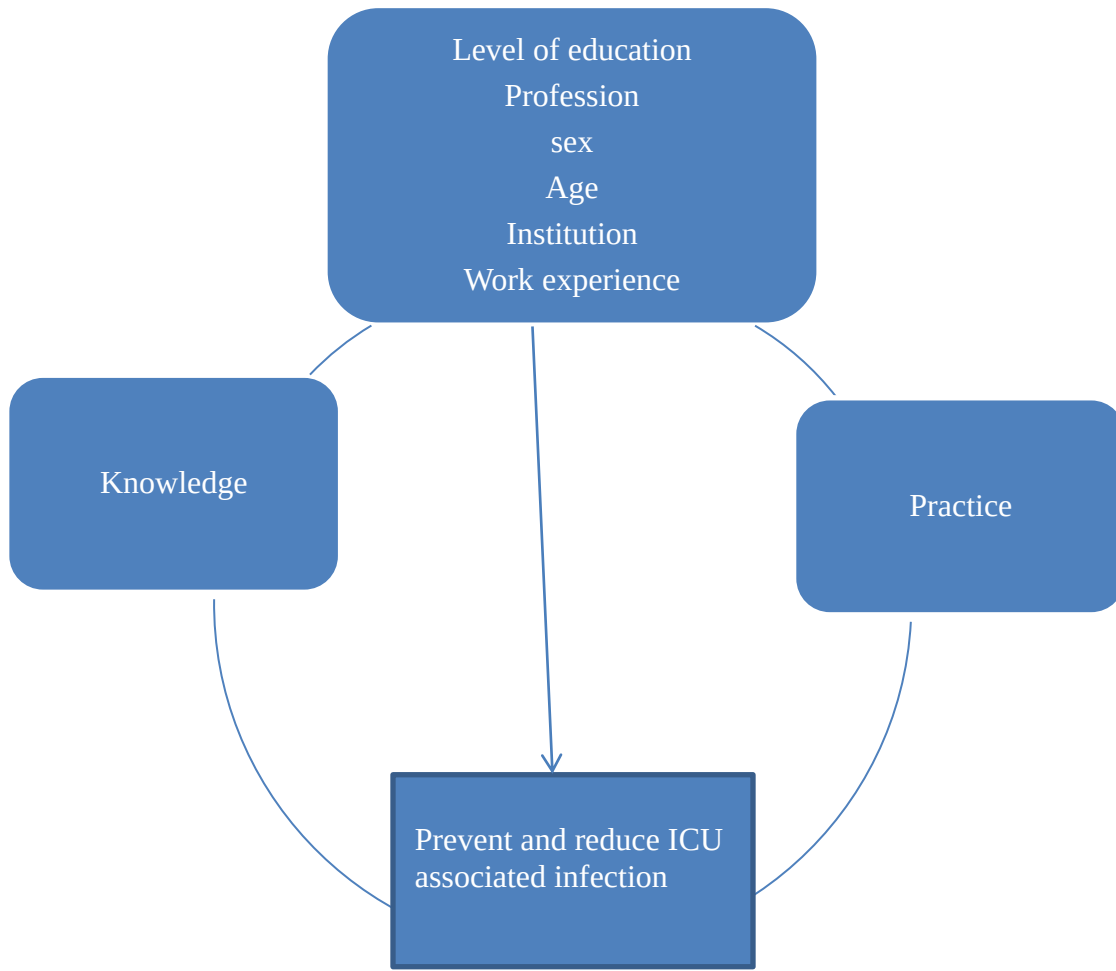


Figure 1: Conceptual framework on knowledge and practice of ICU care bundles and its associated factors among nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa Ethiopia, 2021

CHAPTER 3:OBJECTIVE

3.1. GENERAL OBJECTIVE:

- To assess the knowledge and practice of ICU care bundles among physicians and nurses working in TASH, Yekatit 12 and St. Peter Specialized Hospital Adult ICU, Addis Ababa, Ethiopia 2021.

3.2. SPECIFIC OBJECTIVE

- To assess the knowledge of ICU care bundles among physicians and nurses working in TASH, Yekatit 12 and St. Peter Specialized Hospital Adult ICU, Addis Ababa, Ethiopia 2021.
- To assess the practice of ICU care bundles among physicians and nurses working in TASH, Yekatit 12 and St. Peter Specialized Hospital Adult ICU, Addis Ababa, Ethiopia 2021.
- To assess the associated factors related to knowledge and practice of ICU care bundles among physicians and nurses working in TASH, Yekatit 12 and St. Peter Specialized Hospital Adult ICU, Addis Ababa, Ethiopia 2021.

CHAPTER 4: METHODOLOGY

4.1. STUDY AREA

Addis Ababa, capital of Ethiopia, is situated at the heartland of Ethiopia, with a population of 3,384,569 in an area of 540 square kilometers. The city comprises 11 sub-cities and 28 woredas. The city consists of a total of 79 health facilities including Hospitals; out of which 5 hospitals owned by Addis Ababa Health Bureau, 4 hospitals owned by Federal MOH (Central), 1 AAU, 2 Ministry of defense, 1 police force hospitals which provide different health services. In addition there are about 23 health centers, 9 clinics, and 34 health posts. Among 13 public Hospitals Tikur Anbessa specialized H., St.Peter specialized H., and Yekatit12 conveniently selected because they have an Adult ICU and three of them are teaching hospitals of AAU CHS. The study will be conducted in the ICUs of these three governmental hospitals in Addis Ababa.

4.2. STUDY PERIOD

The study was conducted in 3 selected governmental hospitals in Addis Ababa from September 1 to 30, 2021.

4.3. STUDY DESIGN

A cross-sectional descriptive study was conducted to assess the knowledge and practice of ICU care bundles among physicians and nurses working at three selected governmental hospitals adult ICUs Addis Ababa, Ethiopia.

4.4. SOURCE POPULATION

Physicians and nurses who were working in the governmental hospitals adult ICU in Addis Ababa, Ethiopia.

4.5. STUDY POPULATION

All physicians and nurses who were working in the 3 selected governmental hospital adult ICUs during the data collection period.

4.6. ELIGIBILITY CRITERIA

4.6.1. Inclusion criteria: physicians and nurses who were working in Adult ICUs and who are willing to participate in this study during the study period will be included.

4.6.2. Exclusion criteria: Physicians and nurses who were not currently working in the ICU and refuse to participate in this study.

4.7. SAMPLE SIZE

Sample size was determined by using single population proportion formula for cross-sectional survey and taking the proportion of knowledge and practice of ICU bundles at 50%.

$$n = \frac{(Z_{\alpha/2})^2 p (1-p)}{d^2} = \frac{Z^2 P(1-P)}{d^2} = \frac{(1.96)^2 \times 0.50(1-0.50)}{(0.05)^2} = 384$$

Since the total number of physicians and nurses working in ICU of selected hospitals is N= 133 which is less than 10, 000, a finite population correction formula is applied.

Therefore, $n_f = \frac{n}{1 + n_i/N} = \frac{384}{1 + 384/133} = 99$ Where, n_i – initial and n_f – final sample size

Considering non response rate 5% the sample size for this study was 105 physicians and nurses.

4.8. SAMPLING TECHNIQUE AND PROCEDURES

Participants were selected from 3 selected Hospitals at Addis Ababa. The desired individual samples were selected by using systematic random sampling technique which was by preparing sampling frame based on number of staffs.

Lists of hospitals and number of physicians and nurses working monthly (average) in each Adult ICU.

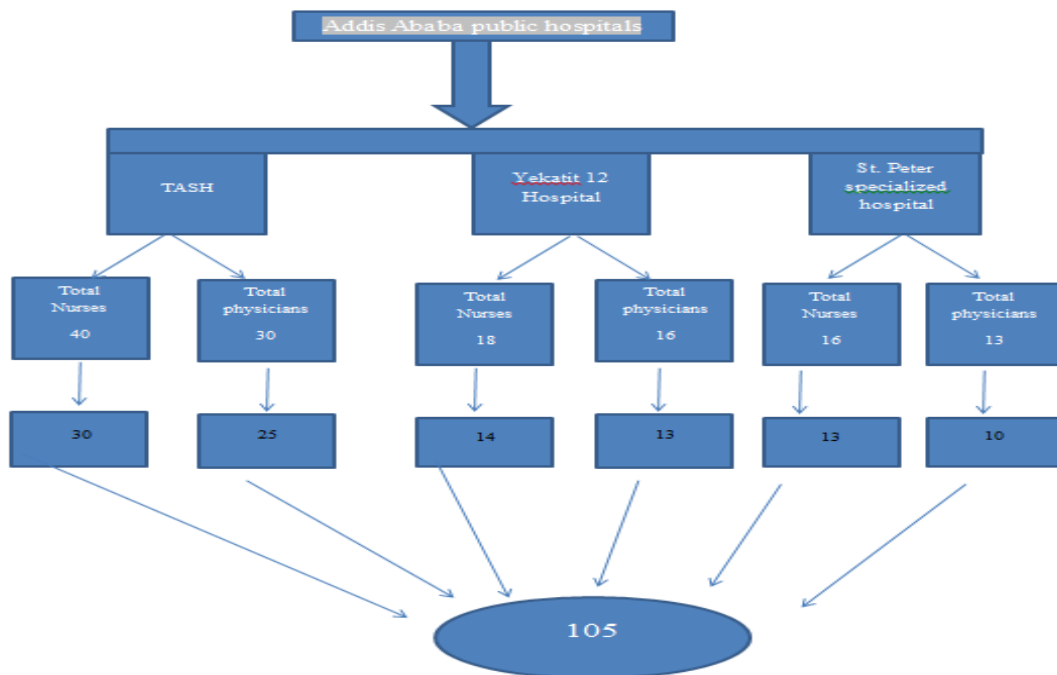


Figure 2: A schematic representation of sampling method¹⁵

4.9. VARIABLES

4.9.1. DEPENDENT VARIABLE

- *Knowledge*
- *Practice*

4.9.2. INDEPENDENT VARIABLES

- *Socio demographic characteristics*
 - Age
 - Sex
 - Educational level and profession
- Institutions (work place)
- Work experience

4.10. DATA COLLECTION TOOLS AND PROCESS

A structured Self-administered questionnaire and observational checklist was used to assess the knowledge and practice of nurses and physicians working in the intensive care units. Both instruments were designed by the principal investigator based on the literature review

4.11. DATA QUALITY CONTROL

During data collection principal investigator checked data for its completeness and missing information at each point. To ensure accuracy, validity of the self-administered questionnaire and the standard observational checklists guide for the assessment was adopted and edited by supervisor; pre-test was done to avoid any confusion during actual data collection period. The principal investigator checked nurse's and Physician's response one week prior to the actual data collection. This was helpful for the investigator to screen out vague questions and modify some of the question item as soon as possible, Further more data was checked during entry into the computer before analysis and the incomplete data was addressed.

4.12. DATA PROCESSING AND ANALYSIS

Collected data from study participants were cleaned, coded and entered in to computer. Incomplete responses were excluded in the analysis. Statistical package for Social Sciences (SPSS) version 26 was used for analysis and descriptive methods such as frequencies, or proportions. Chi square tests were used to look for association with $P < 0.05$ and significant variables were checked for co linearity.

4.13. ETHICAL CONSIDERATION

Ethical clearance was obtained from the institutional review board (IRB) of the department of Internal Medicine, College of Health Sciences, Addis Ababa University and from IRB of both Yehatit 12 and St. Specialized hospital. The objective of the study was made clear to the concerned bodies. In addition, confidentiality and accountability were maintained by the investigator and research assistants throughout the study. The name of the respondents and any identification was not required.

4.14. OPERATIONAL DEFINITIONS

- Knowledge: refers to the correct level of response of the subject regarding the ICU care bundles in infection control elicited through structured questionnaire. Participants who selected a correct choice from a certain item and scored above >60% were considered to be knowledgeable. (36, 37)
- Practice: refers to the actions done by the participants on the subject regarding ICU care bundles use for infection control. Participants who adhere to accepted ICU care bundles practice to prevent infection and scored >60% value were considered to have good practice. (36,37)

4.15. DISSEMINATION AND UTILIZATION OF THE RESULT

The result of the study was communicated to the department of Internal medicine, College of Health Sciences, Addis Ababa University. A copy of the results was submitted to the studied hospitals. The result was presented the department thesis defense conference and sent for publication in scientific journals.

CHAPTER 5: RESULTS

Out of the total 105 nurses and physicians planned for the study, 101 health professionals participated in the study with the response rate of 96.2%.

1. SOCIO DEMOGRAPHIC CHARACTERISTICS

Out of 101 respondents, majority 55 (54.5%) were from TASH, 25 (24.8%) were from Yekatit12 and 21 (20.8%) were from St. Peter specialized hospital. Majority 65 (64.4%) were males and 49 (48.5%) were between 25-30 years of age with mean age of 29.4 (SD± 3.32) years. Also mean year of work experience was 4.68 (SD ± 2.84) years.

Of all respondents, majority 53 (52.5%) were nurses and 48 (47.3%) were physicians, of this majority 48 (47.5%) were BSc nurse and 40 (39.6%) were residents. (Table 1)

Table 1: Socio demographic characteristics of nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa, Ethiopia, 2021.

Variables			Number	Percent (%)
Sex:	Male		65	64.4
	Female		36	35.6
Age	≤ 25		9	8.9
	25-30		49	48.5
	≥30		43	42.6
Institution	TASH		55	54.5
	Yekatit 12 Hospital		25	24.8
	St. Peter specialized Hospital		21	20.8
Work experience	≤ 5 years		73	72.3
	5-10 years		19	18.8
	≥10 years		9	8.9
Educational status	BSc nurse		48	47.5
	MD		4	4.0
	Residency		40	39.6
	Sub-specialization (Fellow and senior)		4	4.0
	MSc (MPH)		5	4.9
Profession	Nurse		53	52.5
	GP		4	4
	Resident	Internal medicine	31	30.7
		Anesthesiology	7	7
		Emergency medicine	2	2
	PCCM Fellow		2	2
	Internist		1	1
	Anesthesiologist		1	1

2. KNOWLEDGE OF THE ICU CARE BUNDLES

Out of all respondents, majority 47 (46.5%) mentioned more than 3 ICU care bundles important for reduction and prevention of ICU infection. Others cited only VAP bundle (17 (16.8%)) and Sepsis bundle (12 (11.9%)).

Knowledge of VAP bundles

More than half of the participants, 53 (52.5%) had knowledge regarding VAP bundles importance for reduction and prevention of ICU infections.

Regarding positioning of intubated patients, 63 (62.4%) of participants were aware that head end elevation prevents VAP and only 24 (23.8%) were familiar with the fact that semi- recumbent position is recommended unless contraindicated.

Majority of respondents, 68 (67.3%) and 86 (85.1%) were aware closed suction system and sterile procedure recommended as standard respectively.

Out of all respondents, 65 (64.4%) were aware of the importance of daily suction systems change and only 48 (47.5%) knew the need for ventilator circuit changes for every new patient.

Almost all, 99 (98%) of participant responded at least once daily oral care were recommended for intubated patients and 67 (66.3%) were aware Chlorhexidine is recommended as oral decontaminant. (Table 2)

Table 2: Knowledge of VAP bundles among nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa, Ethiopia, 2021.

Variables		Frequency	Percent (%)
Knowledgeable about elements incorporated into VAP bundle	Yes	53	52.5
	No	48	47.5
Supine positioning ventilated patient with head elevated at least 30-45 degree	Yes	63	62.4
	No	38	37.6
Semi-recumbent positioning of patients	Yes	24	23.8
System recommended for suction is closed suction system	Yes	68	67.3
	No	33	32.7
Endotracheal tube sectioning procedure is a sterile procedure	Yes	86	85.1
	No	15	14.9
Daily suction systems change	Yes	65	64.4
	No	36	21.8
Recommended ventilator circuit changes every new patient	Yes	48	47.5
	No	53	52.5
At least once daily oral care	Yes	99	98
	No	3	2
Use of Chlorhexidine as oral decontaminant	Yes	67	66.3
	No	34	33.7
Use of a swab moistened with Saline or water for oral care	Yes	25	24.8

Knowledge of Sepsis bundles

Of all respondents, 69 (68.3%) were knowledgeable about elements incorporated into sepsis bundle and 40 (39.6%) of them responded timing of antibiotics administration as after specimen collection for culture and within 1 h of recognition of septic shock each

Regarding monitor septic patients, 56 (55.4%), 9 (8.9%), 9 (8.9%), and 24 (23.8%) were aware of use of $MAP \geq 65$, $CVP \geq 8$, Central venous saturation $\geq 70\%$ and all parameters for monitoring of septic shock patients respectively. (Table 3)

Table 3: Knowledge of Sepsis bundles among nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa Ethiopia, 2021.

Variables		Frequency	Percent (%)
Knowledgeable about elements incorporated into sepsis bundle	Yes	69	68.3
	No	32	2.0
Knowledgeable about activities to be completed within the first 1 h.	Yes	59	58.4
	No	42	2.0
Activities completed within the first 6 h	Yes	40	39.6
	No	61	60.4
Timing of antibiotics administration	After specimen for culture	40	39.6
	within 1 h of recognition of septic shock	40	39.6
	Any time	8	7.9
	After specimen within 1 hr of septic shock recognition	11	10.9
	I don't know	2	2.0
Targets used to monitor septic patients	MAP $\geq$ 65	56	55.4
	CVP $\geq$ 8	9	8.9
	Central venous saturation $\geq$ 70%	9	8.9
	All	24	23.8
	I don't know	3	3.0

Of 101 participants, 15%, 12%, 10% and 58% were aware antibiotics administration, fluid administration, obtain blood culture prior to administration of antibiotics and three of them as activities to be completed within the first 1 h respectively. (Figure 1)

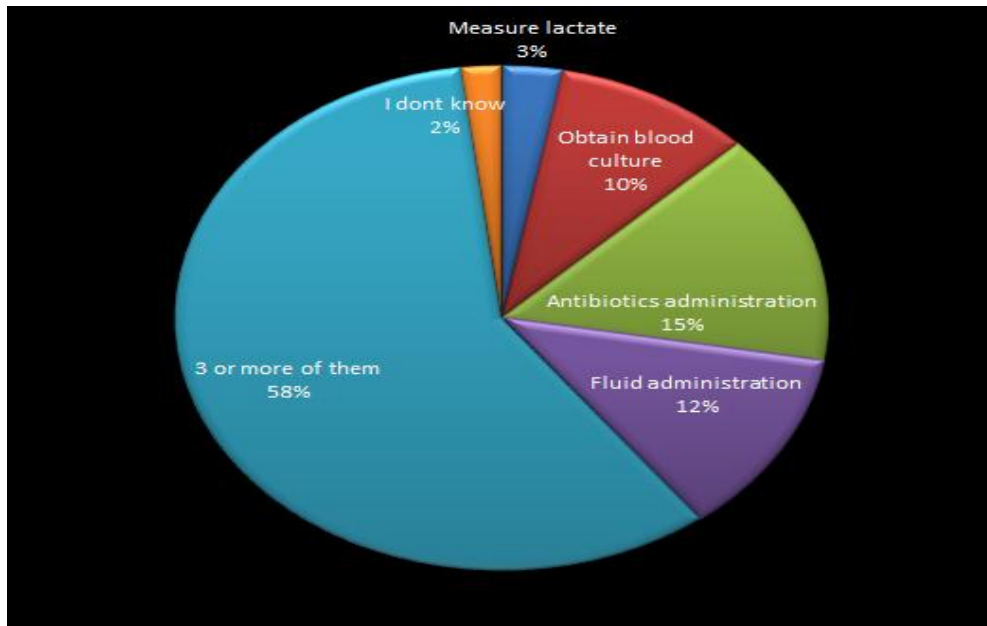


Figure 3: Knowledge of activities to be completed within the first 1 h among nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa Ethiopia, 2021.

This study showed that 31.7% of respondents were aware application of vasopressor for unresponsive shocks and 39.6% of respondent responded more than 3 of sepsis bundles to be completed within 6 hrs. (Figure 2)

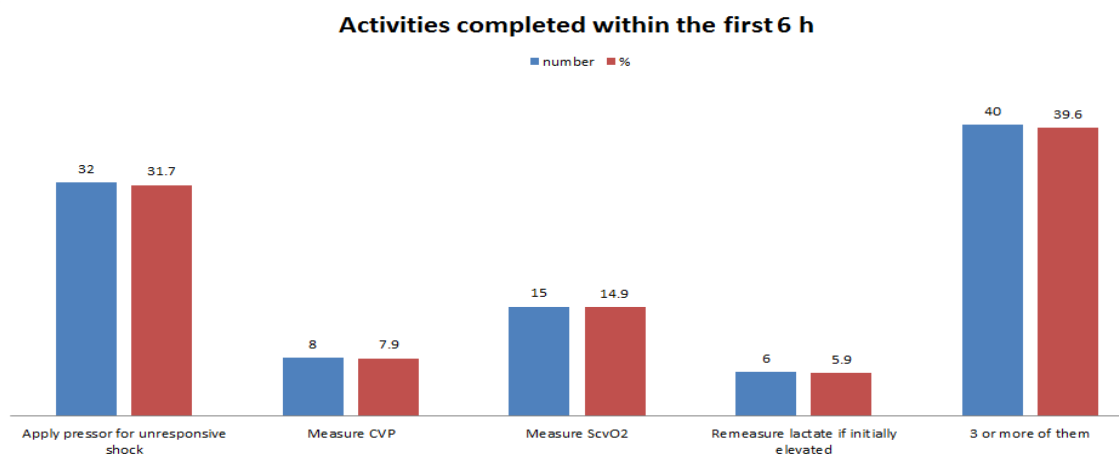


Figure 4: Knowledge of activities to be completed within the 1st 6 h among nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa Ethiopia, 2021.

Knowledge of Urinary catheter bundles

Of all respondents, 79 (78.2%) were knowledgeable about elements incorporated into urinary catheter care bundle and hand hygiene, aseptic insertion and insertion with indications are among elements mentioned. (Figure 3)

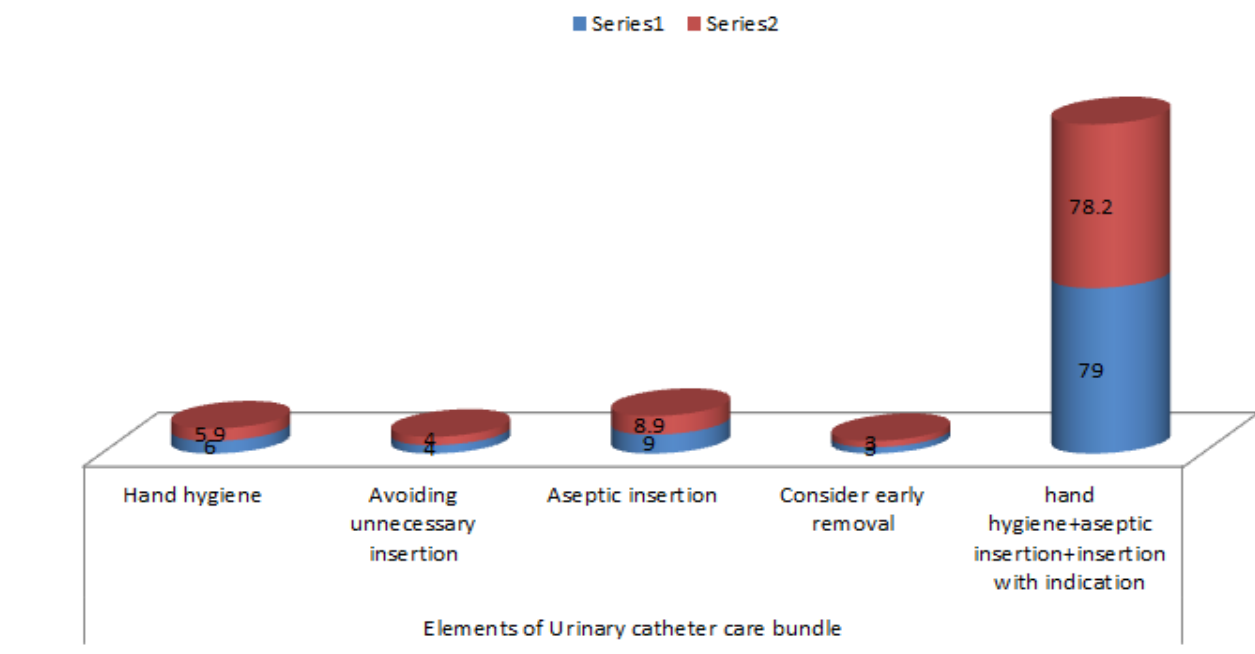


Figure 5: Knowledge of elements of urinary catheter care bundle among nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa Ethiopia, 2021.

Regarding bundle used for aseptic insertion 56 (55.4%) were aware use sterile glove, lubricant jelly and periurethral cleansing decrease CAUTI and all of the respondent and majority (78.2%) responded inflating the retention balloon with 15ml of water and placing the drainage bag below level of the bladder not touch floor were important for maintenance of urinary catheter.

All of the respondents were aware catheter insertion should be with indication and majority, 76.2% mentioned at least 3 indications. (Table 4)

Table 4: Knowledge of Urinary catheter bundles among nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa, Ethiopia, 2021.

Variables		Frequency	Percent (%)
Knowledgeable elements of Urinary catheter care bundle	Yes	79	78.2
	No	23	21.8
Bundle used for aseptic insertion	Use sterile gloves during insertion	25	24.8
	Use of lubricant jelly for insertion	15	14.8
	Use of sterile barrier (drape)	2	2.0
	Cleaning periurethral area least once daily	3	3.0
	>3 of them	56	55.4
Bundles used for maintenance of urinary catheter	Inflate the retention balloon with 15ml of water	101	100
	Drainage bag below level of the bladder not touch floor	79	78.2
	Regularly empty urinary drainage bags	83	82.2
Urinary catheter insertion with indications	Yes	101	100
	No	0	0
Most mentioned Indications	Urinary retention	7	6.9
	Incontinence	6	5.9
	Bladder care	4	4.0
	Therapeutic	2	2.0
	Specimen collection	5	5.0
	3 or more	77	76.2

Factors associated with knowledge of ICU care bundles

Among socio-demographic characteristics and elements of ICU care bundles on crosstabs educational status and profession were found to have statistically significant association with knowledge of ICU care bundles whereas age, sex, work experience and institution has no significant association. (Table 5)

This study showed that physicians has 2 times higher knowledge than nurses regarding VAP bundles (AOR= 2.265 CI (1.347- 3.182), $p < 0.001$) and sepsis bundle (AOR= 2.511 CI (1.354- 3.668), $p < 0.001$) on Binary logistic regression.

Table 5: Factors associated with knowledge of ICU care bundles among nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa, Ethiopia, 2021.

		Elements of ICU care bundles						
Variables		VAP bundles		Sepsis bundles		Urinary catheter bundles		Remark
Educational status		Knowledgeable	Not knowledgeable	Knowledgeable	Not knowledgeable	Knowledgeable	Not knowledgeable	
	BSc	14	22	21	25	26	22	
	MD	3	1	4	0	4	0	
	Specialization	32	9	37	4	41	0	
	Subspecialization	3	1	4	0	4	0	
	MSc	1	3	3	1	4	0	
	p-value (95 % CI)	Chi-Square: 33.691 0.006		36.302 0.003		39.667 0.001		
Institution	TASH	30	25	36	19	43	12	
	Yekatit 12 Hospital	16	9	20	5	21	4	
	St. Peter Specialized hospital	7	14	13	8	15	6	
	P-value (95 % CI)	Chi-Square: 8.406 0.395		9.131 0.331		7.2 0.514		
Work experience	≤ 5	41	32	65	18	59	14	
	5-10	8	11	10	9	13	6	
	≥ 10	4	5	4	5	7	2	
	P-value (95 % CI)	Chi-Square: 48.339 0.757		64.981 0.192		39.056 0.959		
Profession	Nurse	15	38	25	28	31	22	
	Physician	38	10	44	4	48	0	

	p-value (95 % CI)	Chi-Square: 36.888 (0.012)		32.154 (0.042)		33.938 (0.027)		
Age	≤ 25	2	7	3	6	4	5	
	25-30	30	19	40	9	42	7	
	≥30	22	21	26	17	33	10	
	P-value (95 % CI)	Chi-Square:49.105 0.731		66.678 0.155 linear: 0.1555		48.863 0.864		
Sex	Male	37	28	46	9	55	10	
	Female	16	20	23	13	24	12	
	P-value (95 % CI)	Chi-Square:10.125 0.038		1.664 0.797		5.183 0.269		

3. PRACTICE OF THE ICU CARE BUNDLES

Of all respondents, 50 (49.5%), 64 (63.4%) and 68 (67.3%) were observed to have good practice of elements of VAP bundles, sepsis bundle and urinary catheter care bundles in their daily activity respectively. A total of 90 participants were observed using observational check lists.

VAP bundle practice

This study showed that majority, 78 (86.7%) used alcohol/sanitizer for hand hygiene when they were on their daily activity and of this, 71 (78.9%) of them practiced after patient contact.

Majority of participant 72.2% performed daily oral care and of this 62.2% practiced daily rinse mouth with a clean swab.

Of all participants only 37 (41.1%) were practicing closed suction systems but in 63 (70%) procedure were sterile. Daily sedation vacation and spontaneous breathing trial (SBT) trial were practiced by 32 (35.6%) and 55 (61.1%) participants respectively. (Table 6)

Sepsis bundles practice

The finding of this study showed that 70 (77.8%) participant were administer broad spectrum antibiotics within 1 h of recognition of septic shocks but only 26 (28.9%) were de-escalate antibiotic based on culture result.

Also 70 (77.8%) participant administer crystalloid up on recognition of septic shocks and 62 (68.9%) use MAP, CVP or SaO₂ to monitor patient with sepsis and septic shock. But only 13 (14.4%) of participant were obtained blood culture before administration of antibiotics and none of the participant measure lactate level. (Table 6)

Urinary catheter care bundle practice

The result of this study revealed majority, 70 (77.8%) were use urinary catheters with indication, 84 (93.3%) were use sterile gloves during insertion, 76 (84.4%) were use lubricant jelly for insertion, and 83 (92.2%) were inflate the retention balloon with 10ml of water.

But 45 (50%) of participant place drainage bag below level of the bladder not touch floor and 30 (33.3%) were practicing periurethral cleaning least once daily. Only 16.7% practice daily assessment of need of indwelling urinary catheter. (Table 6)

Table 6: Observational check list used to assess practice of ICU care bundles among nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa, Ethiopia, 2021.

ICU Bundles	Practices		Frequency	Percent (%)
Ventilator associated pneumonia bundles	Hand hygiene	Washing with water	6	6.6
		Use of alcohol hand rub	58	64.4
		Both	18	20
	Hand Washing or alcohol rub	Before patient contact	11	12.2
		After patient contact	43	47.8
		Before and after	28	31
		Never	8	8.9
	Oral care practice	Once daily	65	72.2
		Daily rinse mouth with a clean swab	56	62.2
		Daily oral care with chlorhexidine	5	5.6
		Daily oral care with H2O2	4	4.4
	SBT trial	Daily	55	61.1
	Sedation vacations	Daily	32	35.6
	Stress ulcer prophylaxis		62	68.9
	Deep venous thrombosis prophylaxis		43	47.8
	Patient positioning	Supine position with head Elevated at 30-40 degree	90	100.0
		Semi recumbent positioning	24	26.7
		Prone positioning	21	23.3
	Suction systems for	Open suction systems	52	57.8

	intubated patients	Closed suction systems	37	41.1
	Suction procedure for intubated patients	Sterile procedure	63	70.0
		Clean procedure	26	28.9
	Frequency of change in suction systems	Daily changes	81	90.0
		Every new patient	3	3.3
	Frequency of ventilator circuit changes	Every 48 hrs	3	3.3
		Every new patient	66	73.3
Sepsis bundle	Measure lactate level	Not measured	90	100.0
	Obtain blood culture before administration of antibiotics		13	14.4
	Administer broad spectrum antibiotics within 1 h of recognition		70	77.8
	De-escalate of antibiotic based on culture result		26	28.9
	Administer crystalloid for hypotension		70	77.8
	Apply vasopressors for hypotension		42	46.7
	Monitor MAP, CVP or SaO2 of sepsis patient		62	68.9
Urinary catheter bundles	Hand hygiene	Before each patient contact	39	43.3
		After each patient contact	71	78.9
	Use sterile gloves during insertion		84	93.3
	Use lubricant jelly for insertion		76	84.4
	Use of urinary catheters with indication		70	77.8
	Inflate the retention balloon with 10 ml of water		83	92.2
	Periurethral cleaning least once daily		30	33.3
	Drainage bag placed below level of the bladder not touch floor		45	50.0
	Daily assessment of the presence and need for indwelling urinary catheters		15	16.7
	Regularly empty urinary drainage bags as separate procedures, each into a clean container.		47	52.2

Factors associated with practice of ICU care bundles

Among socio-demographic characteristics and elements of ICU care bundles on crosstabs age, educational status and profession were found to have statistically significant association with practice of ICU care bundles whereas sex, work experience and institution has no significant association. (Table 7)

On Binary logistic regression only profession showed significant association with practice of ICU care bundle. Physicians have ~ 2 times higher practice than nurses regarding VAP with AOR= 1.726 CI (0.87 – 2.581), sepsis with AOR= 2.289 CI (1.274 – 3.304) and urinary catheter bundle with AOR= 1.984 CI 0.973-2.994) with $p < 0.001$.

This study showed that there is significant association knowledge and practices (Chi-Square: 44 for VAP, 30 for sepsis and 33.5 for urinary catheter; p all was < 0.001). Correlation is significant at 0.01 level with 99% CI for knowledge and practice all ICU care bundles.

Table 7: Factors associated with practice of ICU care bundles among nurses and physicians working in Adult ICU of 3 selected governmental hospitals, Addis Ababa, Ethiopia, 2021.

		Elements of ICU care bundles						
Variable s		VAP bundles		Sepsis bundles		Urinary catheter bundles		Rem ark
Educatio nal status		Good practice	Not good practice	Good practice	Not good practice	Good practice	Not good practice	
	BSc	15	33	19	29	22	26	
	MD	2	2	4	0	3	1	
	Resident	31	10	35	6	36	5	
	Subspecialization	1	3	4	0	4	0	
	MSc	1	3	2	2	3	1	
	p-value (95 % CI)	Chi-Square: 27.475 0.007		37.541 0.01		28.470 0.005		
Institutio n	TASH	27	28	34	21	33	22	
	Yekatit 12 Hospital	14	11	16	9	21	4	

	St. Peter Specialized hospital	9	12	14	7	14	7	
	P-value (95 % CI)	Chi-Square: 4.355 0.629		8.029 0.626		6.727 0.347		
Work experien ce	≤ 5	37	36	49	24	51	22	
	5-10	7	12	10	9	11	8	
	≥10	6	3	5	4	6	3	
	P-value (95 % CI)	Chi-Square: 34.732 0.779		62.394 0.729		39.85 0.566		
Professi on	Nurse	16	37	22	31	26	27	
	Physician	34	14	42	6	42	6	
	p-value (95 % CI)	Chi-Square: 18.512 (<0.001)		31.859 (<0.001)		22.001 (<0.001)		
Age	≤ 25	0	9	2	7	2	7	
	25-30	30	19	40	9	40	9	
	≥30	20	23	22	21	26	17	
	p-value (95 % CI)	Chi-Square:19.766 0.003		31.573 <0.001		19.632 0.003		
Sex	Male	37	28	45	20	45	20	
	Female	13	23	19	17	23	13	
	P-value (95 % CI)	Chi-Square:6.556 0.087		4.585 0.469		2.313 0.510		

CHAPTER 6: DISCUSSION

The finding of this study showed that, 53 (52.5%) had knowledge regarding VAP bundle, 69 (68.3%) were knowledgeable regarding sepsis bundle and 79 (78.2%) were knowledgeable about urinary catheter care bundle. But 50 (49.5%), 64 (63.4%) and 68 (67.3%) were observed to have good practice of elements of VAP bundle, sepsis bundle and urinary catheter care bundles in their daily activity respectively. Only educational status and profession were found to have statistically significant association with knowledge of ICU care bundles but age, educational status and profession were found to have statistically significant association with practice of ICU care bundles($P<0.05$).

The current finding on knowledge of VAP bundles showed lower knowledge compared to study done in India which was more than half (56.7%) had excellent and 43.3% of them had good knowledge regarding ventilator care bundle (22).The reason may be due to difference in study units, availability of resource (training) and difference in measurement scale.

Although adherences score for EBGs for the prevention of VAP was lower (49.5%) compared to study done in Tanzania the knowledge score was higher (52.5%)for VAP prevention. The reason may be due to difference educational status of the participants (23).

Regarding knowledge of VAP bundle elements the finding of this study showed 66.3% were aware use of Chlorhexidine oral decontaminant and closed suction systems 68 (67.3%) which was higher compared to that of study done in Tanzania showed chlorhexidine antiseptic use 52.6% and closed suction systems (28.4%) but lower knowledge regarding semi- recumbent positioning 24 (23.8%) compared with (70.7%) that of Tanzania (23)

Regarding practice of VAP bundle elements the finding of this study showed semi recumbent positioning 26.7%, sterile sectioning procedure 70%, and hand hygiene after patient contact 78.9%which was lower compared to that of Tanzania which was semi-recumbent positioning 89.2%, hand hygiene between patients 87.5%, and sterile suction procedure 90.8% (23).

The finding of this study showed that both knowledge and practice of VAP bundle is lower when compared with study done in selected governmental hospitals in Addis Ababa that showed 60.7% had satisfactory level of knowledge and 53.3% had Good level of practice (24).The reason may be due to difference in study units and number hospitals involved in the study.

Also in the same study done in Addis Ababa level of education showed significant association with knowledge and practice of VAP bundle which was similar to the finding of this study but sex and work experience had no significant association in this study (24).

This study revealed that the knowledge of sepsis bundle was higher compared to study done in Al-Muthanna City showed 70% do not have knowledge regarding sepsis bundle (28).

Also study in Al-Muthanna City showed level of education has significant level of association and age and gender has no association which was similar to the finding of this study (28).

Of total participants, 15%, 12%, 10% and 58% were aware antibiotics administration, fluid administration, obtain blood culture prior to administration of antibiotics and three of them as activities to be completed within the 1st 1 h which was lower compared to survey done in Turkey which showed of total 59% declared that they have enough knowledge on sepsis management and 68% voted for fluid replacement while 26% and 6% said early antibiotic use and inotropic support are the most important approaches respectively(30). The difference may be due to study unit variability (only physicians involved in Turkey study).

Of all respondents, 78.2% were knowledgeable regarding urinary catheter care bundle which was lower compared to study in Southern India showed majority 82.4% of the participants had average knowledge, 18 (16.7%) had good knowledge regarding prevention of catheter associated urinary tract infections (33).(difference in measurement scale)

This finding of this study showed majority, 67.3% had good practice of urinary catheter bundles with 93.3% were use sterile gloves during insertion, 84.4% were use lubricant jelly for insertion, 50% place drainage bag below level of the bladder not touch floor and only 33.3% were practicing periurethral cleaning at least once daily which was lower compared to study done NICHE hospital showed wearing sterile gloves (97%), hand washing (89%), maintaining a sterile barrier (81%), and using a no-touch insertion technique (73%),and urethral meatal care (43%)(34).(possible reason may be study unit deference and availability of resource).

The result of this study was in line with a study conducted in Nepal regarding association between educational status, profession and age with practice of urinary catheter care bundles were found to have statistical significance but practice of urinary catheter care bundle was higher in this study compared with that of Nepal, which was 64.38% (35).

CHAPTER 7: STRENGTH AND LIMITATION OF THE STUDY

STRENGTH

- The study has included all the illegible subjects in the selected hospitals and has got 96.2% response rate.
- Recall bias was minimized because participants are currently working at adult ICU.
- The data was collected using structured questionnaires and observational check list adapted and modified from other researches.

LIMITATION

- Central line care bundles dropped because the procedure is not regularly practiced in the selected institutions.
- Small sample size.
- The study is limited to ICU nurses and physician working in the 3 selected hospitals so maybe generalization is difficult.
- Some change on sepsis guideline occurs after data collection.

CHAPTER 8: CONCLUSION AND RECOMMENDATION

CONCLUSION

Even though nurses' and physicians' overall knowledge regarding ICU care bundles were good the practice was inadequate and the health care workers did not implement the latest evidenced based bundle practices.

This study revealed that a significant proportion of healthcare workers were not knowledgeable about ICU care bundles used for infection prevention. So the overall knowledge and practice of ICU care bundles used for prevention of ICU infection was suboptimal.

RECOMMENDATION

- In-service training and integration of evidence based guidelines regarding ICU care bundles for prevention of ICU infection for all nurses and physicians working at Adult ICU.
- The need for developing integrated ICU protocol for ICU infection prevention based upon current evidence based guidelines.
- All physicians and nurses working at ICU should implement all the individual elements of a bundle evidence-based practice.
- Compliance to hand hygiene was found to be very poor so every institution should have prepare necessary equipment for infection prevention and monitoring system for applicability.

ANNEXES:

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CONSENT FORM

I am.....working as data collectors in the study of **Assessment of Knowledge and practice of ICU care bundles in infection control among physicians and nurses working in three hospitals Adult ICU, Ethiopia, 2021** and the research undertaking is for a partial fulfillment of specialization in Internal medicine which is fully supported and coordinated by the Department of Internal medicine, Health Sciences College and the designate principal investigator is Dr. MulugetaTeshome. The ethical clearance was obtained from your hospital administrative office.

The purpose of this questionnaire is to gather data on knowledge and practice of ICU care bundles in infection control among physicians and nurses and in this questionnaire name of individuals in the institution will not be written and you have the right to permit or refuse for interview. However your honest willingness to this interview will help us understand Knowledge and practice of ICU care bundles in infection control among physicians and nurses, in order to develop good strategies and solve the problem for the future. We would greatly appreciate your truthful and active participation for the successfulness of the study.

Would this be ok to you?

I understand about the advantage of the research and roles I will have in the research. I have agreed to participate in the research

A. Yes

B. No

If respondent agrees

• Signature:..... Date:

• Place of review A. TASH B. Yekatit 12 H. C. St Peter Specialized H.

Name of Data collector:..... Sign:.....

Name of supervisor:.....Sign:.....

Contact of principal investigator: Phone no.:- 09 11 55 51 66 email: kenoimulgeta@gmail.com

QUESTIONNAIRE

Part I: Socio demographic characteristics of the respondent

1.1.Sex

- A. Male B. Female

1.2.Age _____ in year

1.3.Educational status:

- A. Diploma
B. Degree
C. MD
D. Resident
E. Specialization/ Sub specialization
F. Other (Specify)

1.4.Profession:

- A. Nurse
B. GP
C. Resident: department _____
D. Internist
E. Pulmonologist
F. Surgeon
E. Anesthetist
F. Emergency medicine
G. Others (specify): _____

1.5.Work experience _____ in year

Part II- **Knowledge** of ICU care bundles important in prevention of ICU infection

2.1. Choose ICU care bundles important on reduction and prevention of ICU infection (**more than one answer is possible**)

- A. Ventilator associated pneumonia (VAP) bundle
- B. Central line bundle
- C. Sepsis bundle
- D. Urinary catheter bundle
- E. Others (Specify)_____

2.2. VAP bundle (**more than one answer is possible**)

2.2.1. What are elements incorporated into VAP bundle?

- A. Elevation of the head of the bed at 30-40 degree
- B. Daily oral care
- C. Daily SBT trial
- D. Stress ulcer prophylaxis,
- E. Deep venous thrombosis prophylaxis
- F. Daily “sedation vacations”
- G. Frequent of ETT suctioning and ventilator circuit change
- H. Other (Specify)_____

2.2.2. Recommended type of positioning for ventilated Patient (If there is no C/I)

- A. Supine positioning is recommended with head of the bed elevated
- B. Semi recumbent positioning is recommended
- C. Prone position
- D. The position of the patient does not influence the risk for VAP
- E. I do not know.

2.2.3. Recommended type of suction systems for intubated patients and the procedure is?

- A. Open suction systems and sterile procedure
- B. Closed suction systems and clean procedure
- C. Open suction systems and clean procedure
- D. Closed suction systems and sterile procedure
- E. Both systems
- F. I do not know

2.2.4. Recommended frequency of change in suction systems

- A. Daily changes are recommended (or when clinically indicated)
- B. Weekly changes are recommended (or when clinically indicated)
- C. It is to change systems for every new patient (or when clinically indicated)
- D. I do not know

2.2.5. Recommended Frequency of ventilator circuit changes

- A. Every 48 hours (or when clinically indicated)
- B. Every week (or when clinically indicated)
- C. Every new patient (or when clinically indicated)
- D. I do not know

2.2.6. Which of the following Oral decontaminant is preferable?

- A. Povidone–iodine
- B. Chlorhexidine
- C. Daily rinse mouth with a clean swab
- D. Others (Specify) _____

2.2.7. Frequency of oral care

- A. Once daily
- B. At least once per shift
- C. Following suctioning
- D. I don't know

2.3. Sepsis bundle (more than one answer is possible)

2.3.1. What are elements incorporated into Sepsis bundle?

- A. Serial measurement lactate
- B. Obtain blood culture
- C. Administer broad spectrum antibiotics
- D. Administer crystalloid for hypotension
- E. Apply vasopressors
- F. Other (Specify)_____

2.3.2. Which of the following activities completed within the first 1 h?

- A. Measure lactate level
- B. Obtain blood culture
- C. Administer broad spectrum antibiotics
- D. Administer crystalloid for hypotension
- E. Other (specify)_____

2.3.3. Timing of antibiotics administration:

- A. After collecting specimen for blood culture
- B. Within 1 h of recognition of septic shock
- C. Any time
- D. Other (specify)_____

2.3.4. Which of the following activities completed within the first 6 h?

- A. Apply vasopressors for hypotension that does not respond to initial measure
- B. Measure central venous pressure for pts with persistent arterial hypotension
- C. Measure central venous oxygen saturation if respond to initial measure
- D. Re-measure lactate if initial lactate was elevated
- E. Other (specify):_____

2.3.5. Which of the following is correct regarding targets of sepsis bundles?

- A. Target mean arterial pressure (MAP) ≥ 65 mmHg
- B. Target central venous pressure (CVP) ≥ 8 mmHg
- C. Target central venous oxygen saturation $\geq 70\%$
- D. Other (specify):_____

2.4. Urinary catheter care bundle (**more than one answer is possible**)

2.4.1. What are elements incorporated into urinary catheter bundle

- A. Hand hygiene
- B. Avoiding the unnecessary use of urinary catheters,
- C. Aseptic insertion and maintenance
- D. Consider early removal
- E. Other (Specify)_____

2.4.2. Which of the following used for aseptic insertion & maintenance of urinary catheter

- A. Use sterile gloves
- B. Single-use packet of lubricant jelly for insertion
- C. Sterile barrier (drape)
- D. Antiseptic for periurethral cleaning least once daily
- E. Inflate the retention balloon with 15ml of water
- F. Drainage bag below level of the bladder not touch floor
- G. Other (specify)_____

2.4.3. What are indications of urinary catheter insertion to avoid unnecessary use?

- A. Urinary retention
- B. Urinary incontinence
- C. Loss of consciousness (Bladder care)
- D. Therapeutic
- E. Specimen collection
- F. Other (specify)_____

Part III- **Practice of ICU care bundles** important in prevention of ICU infection

3.1.VAP bundle (**more than one answer is possible**)

3.1.1. Which elements of VAP bundle you practicing in your daily activity?

- A. Elevation of the head of the bed at 30-40 degree
- B. Daily oral care
- C. Daily SBT trial
- D. Stress ulcer prophylaxis and deep venous thrombosis prophylaxis
- F. Daily “sedation vacations”
- G. Frequent of ETT suctioning and ventilator circuit change

3.1.2. Which type of positioning you practiced for ventilated Patient in your setup?

- A. Supine positioning with head of the bed elevated
- C. Prone positioning
- B. Semi recumbent positioning
- D. Other (specify)_____

3.1.3. Which type of suctioning systems used in intubated patients?

- A. Open suction systems and use surgical glove
- B. Closed suctions systems and clean glove
- C. Open suction systems and clean glove
- D. Closed suctions systems and use surgical glove
- E. Other (specify)_____

3.1.4. How frequently you change suction systems

- A. Daily changes are recommended (or when clinically indicated)
- B. Weekly changes are recommended (or when clinically indicated)
- C. It is to change systems for every new patient (or when clinically indicated)
- D. Other (specify)_____

3.1.5. How frequent you change ventilator circuit?

- A. Every 48 hours (or when clinically indicated)
- B. Every week (or when clinically indicated)
- C. Every new patient (or when clinically indicated)
- D. Other (specify)_____

3.1.6. Which of the following Oral decontaminant is used in your setup?

- A. Povidone–iodine
- B. Chlorhexidine
- C. Daily Rinse mouth with a clean swab
- D. Others (Specify) _____

3.1.7. How frequent you give oral care for your patient?

- A. Once daily
- B. At least once per shift
- C. Following suctioning
- D. Others (Specify) _____

3.2. Sepsis bundle (**more than one answer is possible**)

3.2.1. Which elements Sepsis bundle you apply in your daily activity?

- A. Serial measurement lactate
- B. Administer broad spectrum antibiotics
- C. Administer crystalloid for hypotension
- D. Obtain blood culture
- E. Apply vasopressors
- F. Other (Specify)_____

3.2.2. Which of the following activities performed within the first 3 h for septic patient?

- A. Measure lactate level
- B. Administer broad spectrum antibiotics
- C. Administer crystalloid for hypotension
- D. Obtain blood culture with in 1 hr
- E. Other (specify)_____

3.2.3. At what time you initiate antibiotics for septic patient?

- A. After collecting specimen for blood culture
- B. Within 1 h of recognition of septic shock
- C. Any time
- D. Other (specify):_____

3.2.4. Which of the following activities completed within the first 6 h for septic patient?

- A. Apply vasopressors if doesn't respond to initial measure
- B. Measure central venous pressure for pts with persistent hypotension
- C. Measure central venous oxygen saturation if respond to initial measure
- D. Re-measure lactate if initial lactate was elevated
- E. Other (specify):_____

3.2.5. Which of the following parameters used to monitor septic patients?

- A. Mean arterial pressure (MAP)
- B. Central venous pressure (CVP)
- C. Central venous oxygen saturation
- D. Other (specify):_____

3.3. Urinary catheter care bundle (**more than one answer is possible**)

3.3.1. Which of the urinary catheter bundle you apply in while inserting urinary catheter?

- A. Hand hygiene
- B. Avoiding the unnecessary use of urinary catheters,
- C. Aseptic insertion and maintenance
- D. Consider early removal
- E. Other (Specify)_____

3.3.2. When do you wash your hand

- A. Before each patient contact
- B. After each patient contact
- C. Before and after each patient contact
- D. Not at all

3.3.3. Which of the ff is/are applied for insertion and maintenance of urinary catheter?

- A. Use sterile gloves during insertion
- B. Use of lubricant jelly for insertion
- C. Use of sterile barrier (drape)
- D. Cleaning periurethral area least once daily
- E. Inflate the retention ballon with 15ml of water
- F. Drainage bag below level of the bladder not touch floor
- G. Other (specify)_____

3.3.4. To whom you insert urinary catheter in your hospital?

- A. Those with urinary retention
- D. Those with Urinary incontinence
- B. For bladder care
- E. For therapeutic
- C. For specimen collection
- F. Other (specify)_____

Principal investigator: Dr. MulugetaTeshome (IMR3)

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Part III: Observational check list: Assessment of Knowledge and practice of ICU care bundles in infection control among physicians and nurses working in three hospitals (Tikur Anbesa Specialized Hospital (TASH), Yekatit 12 and St. Peter Specialized Hospital) Adult ICU, Ethiopia, 2021.

Place- A. TASH

B. Yekatit 12 H.

C. St. Peter H.

Profession: A. Nurse B. GP C. Resident (Depart)_____D. Senior/Fellow_____

ICU Bundles	Practices		Yes	No	Remark
Ventilator associated pneumonia bundles	Hand hygiene	Washing with water			
		Use of alcohol hand rub			
	Washing or alcohol rub	Before patient contact			
		After patient contact			
	Oral care practice	Daily rinse mouth with a clean swab			
		Daily oral care with chlorhexidine			
		At least once per shift			
	SBT trial	Daily			
		Every other day			
	Daily Sedation vacations				
	Stress ulcer prophylaxis				
	Deep venous thrombosis prophylaxis				
	Patient positioning	Elevation of the head at 30-40 degree			
		Semi recumbent positioning			
		Supine positioning			
	Suction systems for intubated patients	Open suction systems and sterile procedure			
		Closed suction systems and sterile procedure			
	Frequency of change in suction systems	Daily changes			
		Weekly changes			
		Every new patient			
	Frequency of ventilator circuit changes	Every week			
		Every 48 hrs			
		Every new patient			
		When available			47

Sepsis bundle	Measure lactate level	Within 1hr			
		Within 6 hrs			
		Both			
		Not measured			
	Obtain blood culture before administration of antibiotics				
	Administer broad spectrum antibiotics within 1 h of recognition				
	De-escalate of antibiotic based on culture result				
	Administer crystalloid for hypotension or lactate ≥ 4 mmol/l)				
	Apply vasopressors for hypotension				
	Monitor MAP, CVP or SaO ₂ of sepsis patient				
Urinary catheter bundles	Hand hygiene	Before each patient contact			
		After each patient contact			
		Specify:			
	Use sterile gloves during insertion				
	Use lubricant jelly for insertion				
	Use of urinary catheters with indication				
	Inflate the retention balloon with 15ml of water				
	Periurethral cleaning least once daily				
	Drainage bag placed below level of the bladder not touch floor				
	Daily assessment of the presence and need for indwelling urinary catheters				
	Regularly empty urinary drainage bags as separate procedures, each into a clean container.				

Principal investigator Dr. Mulugeta Teshome (IMR3):

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Thank you for participation!!

Declaration

I declare this thesis is entitled “Assessment of knowledge and practice of ICU care bundles in infection control among physicians and nurses working in three government hospitals adult ICU, Addis Ababa, Ethiopia, 2021” is my own original work for the partial fulfillment of masters specialization in Internal Medicine and that it has been presented for AAU, department of Internal Medicine.

Principal Investigator

Name: Dr. Mulugeta Teshome (Internal Medicine R3)

Date:_____

Signature:_____

Advisor

Name: Dr. Tewodros Haile (Consultant Internist and PCCM)

Date:_____

Signature:_____

Department Head

Name: Dr. Abdurezak Ahmed (Consultant Internist and Endocrinologist)

Signature:_____

Date:_____