

## Effect of Educational Program for Nurses Regarding Critical Care Bundle on Patients Outcomes in Intensive Care Units

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### Abstract

**Background:** Critically ill patients experience a variety of distressing symptoms during their intensive care stay including pain, agitation, delirium, weakness, and sleep deprivation. Because of the complexity of caring for those patients, these symptoms are often managed by the “ABCDEF” bundle that improves intensive care unit outcomes. **Aim:** Evaluate the outcomes of educational program about the critical care bundle for the nurses caring of patients in intensive care units. **Design:** Quasi experimental research design was used for current study. **Setting:** Open heart – general Surgery – Neurosurgery ICUs at Nasser institute hospital affiliated to ministry of health /Egypt. **Subject:** Convenient sample of all available critical ill patients (98) & Convenient sample of all available nurses (80) at previous mention setting. **Tools:** Patients Structured interview questionnaire, Patient outcome parameters assessment & Nurses’ self-administered Questionnaire and Observational practice checklist. **Results:** There were highly statistically differences regarding nurses’ level of knowledge domains about critical care bundle components pre, post and slightly decline follow up phases implement program. Also there was a positive correlation regarding practice nurses efficiencies according to their patient’s outcome in pre, post and follow up implement program 96% of patient had complications pre implement program while 45% post implement program and 36 % follow up. **Conclusion:** Implementation of critical care bundle affecting level among the patient’s outcomes to outline the effective intervention & reduce complications in intensive care units. **Recommendation:** Conducting training program for the critical care nurses in intensive care units all hospitals to improve nurse’s performance regarding implementation of care bundle for critical ill patients.

**Keywords:** ABCDEF bundle intensive care units, outcomes of educational program, critical care, patient outcomes parameters, complications of critically ill patients

### Introduction

Critical care or intensive care units (ICUs) is an area of medicine that focuses on the management and treatment of patients are deemed to have a condition that is either immediately life-threatening or presents the risk of becoming life-threatening. These patients are generally cared for in dedicated where specific monitoring of physiology and organ function is possible at a level above that of other units or wards in a hospital. The unique nature and condition of many of the patients in the critical care setting often warrant approaches that differ from the more general acute care population (Labeau et al., 2020).

Patients admitted to ICUS often experience pain, over sedation, prolonged mechanical ventilation, delirium, and weakness. These conditions are important in that they often lead to protracted physical, neurocognitive, and mental health sequel now termed post intensive care syndrome. Changing current ICU practice will not only require the adoption of evidence-based nursing interventions but the development of effective and reliable teams to support these new practices (Tamir et al., 2020).

Nursing care for patients with critical care bundle is an important to be provided which represents an guideline recommended framework for implementing evidence based practices in ICUS, Critical care bundle (ABCDEF) elements include (A) Assess, prevent & manage pain. (B) Both spontaneous awakening trials & spontaneous breathing trials, (C) Choice analgesic and sedation, (D) Delirium: monitoring and management, (E) Early mobility and exercise and (F) Family engagement & empowerment (Ross et al., 2020).

Critical care bundle nursing performance was associated with significant improvements in patient’s clinical outcomes in ICUS, after relevant covariates were controlled for the effect of quality improvement collaborative participation on important process measures such as overall bundle adoption and delivery of the separate evidence-based interventions contained in the bundle remains unclear. The range of impact the quality improvement collaborative had at the individual ICU level is also unknown. These are important knowledge gaps considering the limited empirical data describing current national ABCDEF bundle performance rates, the uncertainty

surrounding how long it takes to effectively implement the bundle, and the paucity of detailed descriptions of whether QIC participation effects bundle adoption in some ICUs more than others (Huijsman et al., 2020).

The multifold potential benefits of these recommended strategies outweigh minimal risks of costs and coordination. Ultimately, the ABCDEF bundle is one path to well-rounded patient care and optimal resource utilization resulting in more interactive ICU patients with better pain control, who can safely participate with their families and healthcare providers in higher-order physical and cognitive activities at the earliest point in their critical illness (Buttaro et al., 2020).

## Significance of the study

Critically ill patients frequently experience sleep deprivation which has detrimental effects such as increased pain perception, impaired cognitive function & delirium which is associated with higher mortality, psychological dependence & health care costs (Smeltzer et al., 2019). As well as, world health organization revealed that the ICUS are the highest mortality units in any hospital. There are approximately 6 million ICU admissions per year in the United States with an average mortality rate ranging from 20-30%, or about 700,000 annually (WHO, 2021).

Intensive care unit has grown significantly over decades and now consumes a considerable part of income of many countries worldwide. Also, critically ill patients are a highly heterogeneous population who tend to have many comorbidity. The overall ICUs mortality rates vary from 11.9%, (Oceania) to 39.5%, (Africa). However, the ICU mortality rate varies with patients, demographics, region, and morbidity type. The concurrent comorbidities including metabolic, cardiac, renal, hematologic and hepatic comorbidities before admission should be considered (Hoertel et al., 2022).

In Egypt, Nasser institute hospital statistically record revealed that total critical ill patients admitted at ICUs in (2020) were (5963) & death was 800 patients representing (13.42%) of total admission patients, as well as, in (2023). Total admitted patients were (6100) & death was (1223) patients representing (20%) of total admitted patient (Nasser institute hospital statistically report in 2020 & 2023).

Whereas the critical care bundle is an evidence-based approach to the holistic nursing management of the patients in ICUS for optimizing their recovery, minimizing pathogenesis, engaging and empowering the patients and their families during their hospitalization and consequently decreasing morbidity & mortality rates among such group of patients (Balas & Burke, 2020). This study is conducted to evaluate effect of educational Program for nurses regarding the critical care bundle on the patient's outcomes in intensive care units. Hopefully this study will generate attention to be used as a guide of enhancing quality of care for such group of patients & decreasing morbidity & mortality rates.

## Aim Of The Study

The present study aims to evaluate effect of educational Program for nurses regarding critical care bundles on patients outcomes in intensive care unit through the following:

- Assessing the patients outcomes preprogram implementation.
- Developing educational program about the critical care bundle for nurses caring of patients in intensive care units.
- Assessing the patients outcomes post program implementation.

## Research hypotheses

**This study is hypnotized that:**

Implementing an educational program for nurses regarding critical care bundles will significantly improve patient's outcomes parameters.

## Operational definition:

Patient outcomes including the following parameters: length of stays, readmission, discharge and complications such as: ventilators associated pneumonia, deep venous thrombosis, pressure ulcer, infections and mortality, such parameter will be measured by relevant tools developed by investigator based on relevant literature review. Besides other parameters such as pain, agitation, delirium level etc assessed by standardized measuring tools. Educational program is developed by investigator based on literature review comprising critical care bundle and it is components for caring of patients in ICUs which implemented in form scientific sessions.

## Subjects And Methods

**Research design:**

A quasi-experimental design used to achieve the aim of the present study. It's an empirical interventional study used to estimate causal impact of intervention on target population without random assignment, most likely to be conducted in field setting in which random assignment is difficult or impossible due to the investigator lacks full control over the intervention (Neves & Daniel, 2020).

Setting:

The study will be conducted in (Open heart – general Surgery – Neurosurgery ICUs at Nasser institute hospital affiliated to ministry of health /Egypt. Open heart unit is located in 1st & 2nd floors and each floor is included 25 beds with total 50 beds & (28 nurses). General Surgery ICU is located in the 3rd floor & included 40 beds with (25 nurses). Neurosurgery ICU is located in 4nd floor; each floor is included 15 beds with total 30 beds and (27 nurses) who agree to participate in the study. This setting is selected for providing health care services for a huge number of patients from different governorates allover Egypt with various socioeconomic standard.

**Subjects:**

Convenient sample of all available critical ill patients (98) will be selected as a representative of total patients admission rate in ICUS (N=5963) at Nasser Institute hospital during the period 2020. The study subjects, they will be divided into two groups, control group is not received any educational program and takes routine care daily in ICU and study group will receive educational program.

**Sample size**

The sample size will be calculated by adjusting the power of the test to 80% and the confidence interval to 95% with margin of error accepted adjusted to 5% using the following equation:

Type I error (a) =0.05

Type II error (B) =0.2

With power of test 0.80

$$n = \frac{N \times P (1-P)}{[N-1 \times (d^2 \div Z^2)] + p(1-p)}$$

*(Murtaza, 2020)*

$N \times P (1-P) = [5963 * (0.05 * (1-0.05))]$

$N-1 = (5963-1)*$

$d^2/Z^2 = 0.0025/ 3.8416+$

$P (1-P) = 0.05 * (1-0.05)$

$n = 98$

$N = \text{Community size.}$

$Z = \text{Class standard corresponding to the level of significance equal to 0.95 and 1.96.}$

$D = \text{the error rate is equal to 0.05.}$

$P = \text{Ratio providers a neutral property} = 0.05.$

**Tools of data collection**

**Three tools was used for data collection including the following:**

Tool (I) Structured interview questionnaire was be designed by investigator based on literature review (Miskovic & Lumb, 2020; Elesawy et al., 2020; Valchanov et al., 2020; and Potter et al., 2020) and include the following:

- Part A. Demographic data: which includes, age, sex, patient's level of education and marital status.
- Part B. Medical data. Which includes, past history (medical & surgical) chief complains (present history, diagnosis, frequency for admission, length of stay, weaning process & weaning criteria.

**Tool (II): Patients outcomes parameters assessment:**

It would be designed by the investigator based on the literature review (Sengupta et al., 2020; Al –Qubati et al., 2019; Baird & Bethel, 2020; Mason et al., 2020) and was include the following:

1-Patients length of stay, readmission, discharge and complications such as: ventilator associated pneumonia, bed sores, infections as pneumonia and mortality these parameters will be measured by relevant tools developed by investigator based on literature review (Cran et al., 2020; Ehlenbach et al., 2020; Gelinas et al., 2020).

2- Other patient outcomes parameters would be assessed by using the following tools:

a-Patient pain assessment, was assessed by using the following tools:

Critical pain observational tool was developed by Wesley et al., (2002) to assess intubated or sedated patients pain based on facial expressions, muscle tension and movement as well as compliance with ventilated breaths for intubated patients or vocalized pain for non-intubated patients. The Behavioral Pain Scale would be developed by Tersteegen et al., (2003) to assess pain in the intensive care unit (ICU). It can be used for intubated patients and non-intubated patients.

Scoring for patient pain assessment including critical pain observation tool which will be measured from: 0-2 Mild pain, 3-4 Moderate pain & 5-8 Severe pain & behavior Pain scale, 4-6 Mild Pain, 7-9 Moderate Pain & 10-12 severe pain.

b- Patient Awakening & breathing assessment will be developed by Dasta et al., (2005) using both spontaneous Awakening trials & spontaneous breathing trials safety criteria for weaning.

Scoring system: If patient meets the safety criteria will take 1 score and if fails will take zero.

c- Patient agitation level assessment would be assessed by using the following tool. Richmond Agitation Scale would be developed by Ely et al., (2003), to assess the level of alertness and agitated behavior among patients in the ICU and Sedation Agitation scale would be developed by Wesley et al., (2002), to assess patients agitation level among patients in the ICU.

Scoring system for Agitation level includes 22–28 as mild agitation, 29–35 as moderate agitation & 36–56 as severe agitation.

d- Patients confusion and delirium level assessment would be assessed by the following tools: Confusion Assessment method for ICU flow sheet, to assess delirium level among patients in the ICU & Intensive care delirium screening checklist, to assess delirium level among patients in the ICU developed by Wesley et al., (2002).

Scoring system for confusion it includes 4 features each feature had two options either present or absent. If present was take 1 score & absent was take zero, so total score was classified as following, if criteria in all features are met indicating positive delirium & if criteria in all features are not met indicating negative delirium & As well as, Intensive care delirium screening checklist total score would be ranged from: 0-2: No Delirium, 3-5: Mild to Moderate Delirium & 6-8: Severe Delirium.

e- Early mobility and exercise ability assessment would be assessed by Perms et al., (2006) to assess patients level of dependence for performing activity of daily living (ADLs).

Scoring system would be classified in (<10) dependent & between (10 -13) safe mobility and independence in ADL, and (> 14) independent in basic ADLs.

### **Validity:**

The content validity of the used tools, it was established by a panel of seven experts from medical surgical nursing department faculty of nursing Ain Shams university who reviewed data collection for tools clarity, accuracy, relevance, comprehensiveness and necessary modifications were done accordingly.

### **Reliability:**

Cronbach's alpha was used to assure the internal consistency of the tools.

### **Ethical considerations:**

Ethical research considerations in this study include the following:

- The research approval would be obtained from scientific research ethical committee in faculty of nursing at Ain Shams University before starting the study.
- The researcher clarified the objective and aim of the study to the subjects included in the study.
- The researcher assured maintaining anonymity and confidentiality of the subject data.
- Subjects were informed that they are allowed to choose to participate or not in the study and that they have the right to withdraw from the study at any time.

### **Administrative design:**

An official permission was obtained from the dean of faculty of nursing Ain Shams to the director of Nasser institute hospitals to obtain their approval and assistance in conducting this study.

### **Pilot study:**

A pilot study was carried out on 10% of study subjects (10 patients) to test clarity and applicability and time needed for filling the used tools and necessary modifications will be done according to the result of pilot study.

### Field work:

Field work was include three phases as follow:

- Assessment and Planning phase
- Implementation phase
- Evaluation phase

### Assessment and Planning phase

This phase was implemented through the following steps:

- Interviewing with the patients under study to explain the aim of the study and take them approval prior to any data collection.
- Data collection was done three days /week by the investigator in morning shifts.
- Assessing the patients outcomes parameters by using the data collection tools preprogram implementation as a baseline data.
- Based on the results obtained from patients outcomes assessment & recent mentioned and international related review literature. The investigator was develop educational program for nurses.

### Implementation phase:

The researcher was implement an educational program for nurses related to all critical care bundle covering all its elements (ABCDEF) for caring of patients in ICU in form of scientific sessions according to time table taking into consideration the nurses working time in ICUs.

### Evaluation phase:

This phase was include evaluating the effect of educational program for nurses patients outcomes parameters using all the above previous mentioned tools.

### Statistical design:

The collected data will be organized, and analyzed using appropriate statistical significant tests.

## Results

### Part I: Demographic characteristic of patient:

**Table (1): Number and percentage distribution of the studied patients according to their demographic data (N=98).**

Demographic characteristic	No.	%
<b>Age (years)</b>		
20-30.	8	8.2
30-40.	12	12.2
40-50.	42	<b>42.9</b>
50- 65	36	36.7
$\bar{X} \pm SD$	<b>49.06±16.98</b>	
<b>Gender</b>		
Male	53	<b>54.1</b>
Female	45	45.9
<b>Marital status</b>		
Married	35	<b>35.7</b>
Single	21	21.4
Divorced	33	33.7
Widowed	9	9.2
<b>Patient's level of education</b>		
Illiterate education.	18	18.4
Primary education.	44	<b>44.9</b>
Secondary education.	28	28.6
Higher education	8	8.2

Table (1) Shows that the mean of slandered deviation of patients were 49.06±16.98, 54.1%, of them were male, 35.7% were married, 44.9 % of patients had primary level of education.

### Part II: Medical Data

**Table (2): Number and percentage distribution of the studied patients according to their medical data (N=98).**

Past history	N	%
<b>chronic disease:</b>		
Yes	69	<b>70.4</b>
No	29	29.6
<b>The patients' history of chronic disease</b>		
DM	46	<b>46.9</b>
HTN	53	<b>54</b>
Hepatitis	13	13.3
Tumors	18	18.4
<b>Previous surgeries</b>		
Yes	33	<b>33.7</b>
No	65	66.3
<b>Type of surgery (No =33)</b>		
Angioplasty	6	18.2
Tonsillectomy	5	15.1
Cardiac catheterization	5	15.1
Cholecystectomy	4	12.2
Exploration	3	9.1
Heart Valve Repair	7	<b>21.2</b>
Kidney stones	2	6.1
Liver Biopsy	1	3

Table (2) Shows that 70.4% of patients had chronic disease, such as HTN, DM, (54%, 46.9%) respectively 33.7% of them had previous surgery, 21.2% of them had heart valve repair surgery

**Table (3): Number and percentage distribution of the studied patients according to their medical health diagnosis (N=98).**

Items	Pre		Post		Follow-up		Pre vs. Post		Pre vs. FU	
	N	%	N	%	N	%	x2	p-value	x2	p-value
<b>Duration of stay in the intensive care unit</b>										
<1 week	28	28.6	68	69.4	67	68.4	31.054	<0.001**	29.497	<0.001**
≥1 week	70	<b>71.4</b>	30	<b>30.6</b>	31	31.6				
<b>Frequency of admissions for care</b>										
Not oncek	7	7.1	20	20.4	19	19.4	35.071	<0.001**	32.422	<0.001**
Once	15	15.3	15	15.3	14	14.3				
Twice	22	22.4	20	20.4	22	22.4				
Three times	18	18.5	14	<b>14.3</b>	12	12.2				
More	36	<b>36.7</b>	29	29.6	31	31.7				
<b>Duration of stay on mechanical ventilation</b>										
> 2 days	5	5.1	13	13.3	15	15.3	65.002	<0.001**	58.979	<0.001**
One week	20	20.4	30	30.6	29	29.5				
Two weeks	16	16.3	10	<b>10.2</b>	13	13.3				
Three weeks	30	<b>30.7</b>	25	25.5	23	23.5				
One month	27	27.5	20	20.4	18	18.4				
<b>Classification of weaning by duration</b>										

Simple immediately weaning	5	5.1	13	13.3	15	<b>15.3</b>	38.298	<0.001**	54.909	<0.001**
Difficult 2-7 day	20	20.4	55	<b>56.1</b>	54	55.2				
Prolonged more than 7 days	73	<b>74.5</b>	30	30.6	29	29.5				

P-value <0.05 significant, P-value <0.001 highly significant and P-value >0.05 insignificant. x2 Chi Square test Table 3)) Shows that 71.4% of the studied of patients had duration of stay in the intensive care unit were ≥1 week, 36.7% of them had frequency of admissions for care more than three times and 30.7% of them had three weeks of stay on mechanical ventilation, 74.5% of them had prolonged weaning more than 7 days in pre implement of the program & 30.6% of them had duration of stay in the intensive care unit, 14.3% of them had frequency of admissions for care & 56.1% of them had difficult weaning in post implement of the program, theirs highly significant with at p value <0.001.

**Table (4): Comparison between pre, post & follow up test scores of studied patients removed from mechanical ventilation based on normal ABG and weaning criteria (N=98).**

Items	Pre		Post		Follow-up		Pre vs. Post		Pre vs. FU	
	N	%	N	%	N	%	x2	p-value	x2	p-value
The patient was removed from mechanical ventilation based on normal ABG criteria	18	<b>18.4</b>	80	<b>81.6</b>	78	79.6	30.326	<0.001**	33.992	<0.001**
The patient was removed from mechanical ventilation based on weaning criteria	15	<b>15.3</b>	83	<b>84.7</b>	80	81.6				

P-value <0.05 significant, P-value <0.001 highly significant and P-value >0.05 insignificant. x2 Chi Square test Table (4) Shows that 18.4% and 15.3 % of the studied patients had removed from mechanical ventilation based on normal range of atrial blood gases & weaning criteria in pre implement of the program respectively while 81.6 %and 84.7 % of them had removed from mechanical ventilation based on normal range of atrial blood gases & weaning criteria in post implement of the program respectively with slightly decline follow up, theirs was highly significant at p value <0.001.

### Part III: Patient Pain Assessment: through using Critical-Care Pain (CPOT)

**Table (5): percentage distribution for total scoring system regarding Critical-Care Pain among studied patients N (98)**

Items	Pre		Post		Follow-up		Pre vs. Post		Pre vs. FU	
	N	%	N	%	N	%	x2	p-value	x2	p-value
Mild 0-2	13	13.3	45	<b>45.9</b>	44	<b>44.9</b>	36.793	<0.001**	32.213	<0.001**
Moderate 3-4	30	30.6	35	35.7	33	33.7				
Severe 5-8	55	<b>56.1</b>	18	18.4	21	21.4				
Total 8	98	100.0	98	100.0	98	100.0				

P-value <0.05 significant, P-value < 0.001 highly significant and P-value >0.05 insignificant. x2 Chi square test Table (5) Shows that 56.1% sever of pain, in pre implement program, 45.9.% mild of pain in post implement program and 44.9% mild pain in follow up theirs was highly significance with P-value < 0.001.

**Table (6): Percentage distribution for total scoring system regarding Behavior pain among studied patients N (98)**

Items	Pre		Post		Follow-up		Pre vs. Post		Pre vs. FU	
	N	%	N	%	N	%	x2	p-value	x2	p-value
Mild 4 -6	15	15.3	50	<b>51</b>	49	<b>50</b>	39.336	<0.001**	35.992	<0.001**
Moderate 7-9	23	23.5	28	28.6	27	27.6				
Severe 10-12	60	<b>61.2</b>	20	20.4	22	22.4				

P-value <0.05 significant, P-value < 0.001 highly significant and P-value >0.05 insignificant. x2 Chi square test Table (6) Shows that 61.2% sever of pain, in pre implement program, 51% mild of pain in post implement program and 50% mild pain in follow up theirs was highly significance with P-value < 0.001.

#### Part IV: Assessment the patient ability the weaning through using wake up and breath protocol

Table (7): Number and percentage distribution of the studied patients regarding the weaning (N=98).

Items	Pre		Post		Follow-up		Pre vs. Post		Pre vs. FU	
	SAT Safety Screen	SBT Safety Screen	SAT Safety Screen	SBT Safety Screen	SAT Safety Screen	SBT Safety Screen	x2	P-value	x2	p-value
	Spontaneous a waking trials		Spontaneous a waking trials		Spontaneous a waking trials					
	No	%	No	%	No	%				
Pass 1	28	28.6	67	<b>68.4</b>	65	<b>66.4</b>	29.4	<0.001**	26.51	<0.001**
Fail 0	70	<b>71.4</b>	31	31.6	33	33.6	97	1**	8	**
	Spontaneous Breathing Trial		Spontaneous Breathing Trial		Spontaneous Breathing Trial		34.3	<0.001**	31.05	<0.001**
Pass 1	30	30.6	72	<b>73.5</b>	70	<b>71.5</b>				
Fail 0	68	<b>69.4</b>	26	26.5	28	28.5	63	4		

P-value <0.05 significant, P-value < 0.001 highly significant and P-value >0.05 insignificant. x2 Chi square test Table (7) Shows that there was a highly statistically significance between the patients ability weaning regarding Spontaneous a waking trials and Spontaneous Breathing Trial with p value <0.001.

#### Part V

Table (8): Percentage distribution for total scoring system regarding patients level agitated (N=98).

Items	Pre		Post		Follow-up		Pre vs. Post		Pre vs. FU	
	N	%	N	%	N	%	x2	p-value	x2	p-value
Mild Agitated (22-28)	7	7.2	55	<b>56.2</b>	54	<b>55.1</b>	47.362	<0.001**	45.223	<0.001**
Moderate Agitated (29-35)	26	26.5	20	20.4	21	21.4				
Severe Agitated (36 -56)	65	<b>66.3</b>	23	23.4	23	23.5				

P-value <0.05 significant\*, P-value < 0.001 highly significant and P-value >0.05 insignificant. x2 Chi square test

Table (8) Shows that 66.3% sever agitated, in pre implement program while 56.2% mild agitated in post implement program and 55.1% mild pain in follow up theirs was highly significance with P-value < 0.001.

**Part VI: Assessment patients Confusion and delirium level through using Confusion Assessment method for ICU Sheet and Intensive care delirium screening checklist**

**Table (9): Percentage distribution for total scoring system regarding intensive care delirium screening checklist (N=98).**

Items	Pre		Post		Follow-up		Pre vs. Post		Pre vs. FU	
	N	%	N	%	N	%	x2	p-value	x2	p-value
0-2: No Delirium,	18	18.4	43	43.9	46	47	53.063	<0.001**	55.771	<0.001**
3-5: Mild to Moderate Delirium,	20	20.4	44	<b>44.9</b>	42	42.8				
6-8: Severe Delirium	60	<b>61.2</b>	11	11.2	10	10.2				

P-value <0.05 significant\*, P-value < 0.001 highly significant and P-value >0.05 insignificant. x2 Chi square test Table (9) Shows that 61.2% sever delirium, in pre implement program while 44.9% mild to moderate delirium in post implement program and slightly decline in follow up theirs was highly statistically significance with P-value < 0.001.

**Part VII: Early mobility and exercise of care patients**

**Table (10): Percentage distribution for total scoring system regarding early mobility & exercise (N=98).**

Items	Pre		Post		Follow-up		Pre vs. Post		Pre vs. FU	
	N	%	N	%	N	%	x2	p-value	x2	p-value
Dependent - under 10	22	<b>22.5</b>	42	<b>42.9</b>	39	39.8	21.187	0.001**	20.591	0.001**
safe mobility and independence 10-13	30	<b>30.6</b>	36	<b>36.7</b>	30	30.6				
independent in basic ADL over 14	46	<b>46.9</b>	20	<b>20.4</b>	29	29.6				

P-value <0.05 significant\*, P-value < 0.001 highly significant and P-value >0.05 insignificant. x2 Chi square test

Table (10) Shows that 22.5%, 30.6 %, 46.9 % regarding dependent, safe mobility and independence, independent in basic ADL in pre implement program while 42.9%, 36.7 %, 20.4 % regarding dependent, safe mobility and independence, independent in basic ADL in post implement program and slightly decline in follow up theirs was highly statistically significance with P-value < 0.001

Figure (1): Percentage distribution of the studied patients regarding total of complications (N=98).

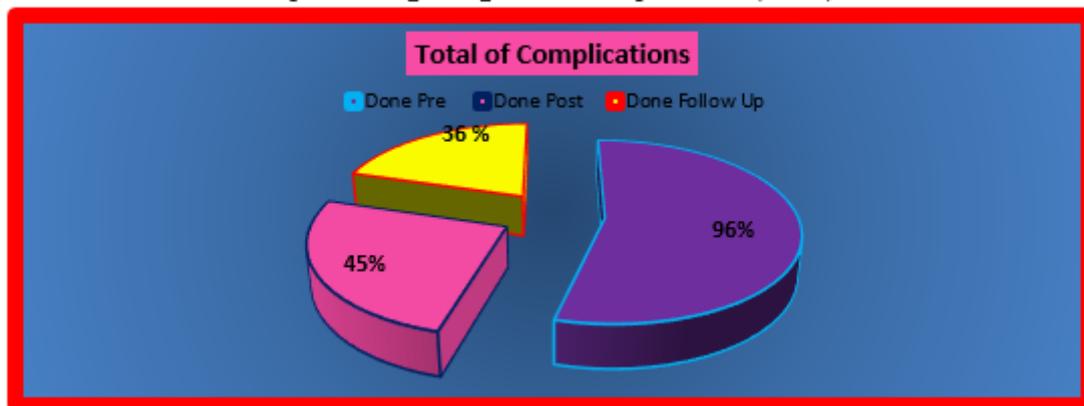


Fig. (1) Shows that 96% of patient had complications pre implement program while 45% post implement program and 36 % follow up.

## Relation and correlation between the study variables

Table (11): Correlation between total practice about nurses efficiencies according to their patient's outcome.

Patients outcome	Practice about nurses efficiencies					
	Pre program		Post program		Follow-Up	
	r-value	p-value	r-value	p-value	r-value	p-value
Patient's length of stay	0.144	0.233	0.643	<0.001**	0.318	0.038*
Readmission	0.162	0.198	0.364	0.027*	0.397	0.022*
Discharge	0.153	0.207	0.602	<0.001**	0.379	0.023*
Ventilator associated pneumonia	0.151	0.231	0.328	0.036*	0.744	<0.001**
Bed sores	0.281	0.105	0.350	0.031*	0.345	0.033*
Infections as pneumonia	0.117	0.274	0.660	<0.001**	0.722	<0.001**
Mortality	0.143	0.236	0.491	<0.001**	0.526	<0.001**
Critical-Care Pain Observation score	0.255	0.141	0.541	<0.001**	0.465	<0.001**
Behavior Pain score	0.114	0.276	0.346	0.032*	0.714	<0.001**
Safety Screen for Both SAT & SBT score	0.128	0.245	0.718	<0.001**	0.535	<0.001**
Agitation level	0.265	0.140	0.329	0.035*	0.311	0.042*
Delirium level	0.118	0.265	0.790	<0.001**	0.654	<0.001**
Early mobility and exercise of care patients level	0.281	0.107	0.673	<0.001**	0.416	<0.001**
Activity level	0.202	0.144	0.455	<0.001**	0.346	0.032*

r-Pearson Correlation Coefficient; p-value >0.05 is insignificant; \*p-value <0.05 is significant; \*\*p-value <0.001 is highly significant

Table (11) Reveals that there was a positive correlation between pre & post program also follow up regarding total practice about nurses efficiencies according to their patient's outcome. Also there was highly significant in post program & follow up at p -value <0.001, regarding Patient's length of stay, discharge, infections as pneumonia, mortality, critical-care pain observation score, safety screen for both SAT & SBT, delirium level, early mobility and exercise of care patients level, functional muscle strength level, activity level respectively and significant at p- value (0.027,0.036, 0.031,0.032, 0.035) respectively for readmission, ventilator associated pneumonia, bed sores, behavior Pain score, agitation level.

## Discussion

The discussion of study finding covered three main parts, part 1: presented demographic characteristic, age, sex, marital status, level of qualification. Part II; medical data: past history chief complains (present history), diagnosis, frequency of admissions for ICU care, length of stay, classification of patients according to the weaning process, mechanical ventilation weaning criteria. Part III; Patients outcomes parameters assessment: 1-Patients length of stay, readmission, discharge and complications such as: ventilator associated pneumonia, bed sores, infections as pneumonia and mortality, other patient outcomes parameters will be assessed by using the following tools: Critical-Care Pain Observation Tool (CPOT), Behavioral pain assessment scale, wake up and breath protocol,

assessment the patient level agitated patient through using Richmond agitation sedation scale (RASS), sedation agitation scale, assessment patients confusion and delirium level through using: confusion assessment method for ICU sheet & intensive care delirium screening checklist, Early mobility and exercise of care patients and complications.

Regarding patients age, the current study revealed that half of studied patients the mean age  $49.06 \pm 16.98$  and ranged from 40-50 years from researcher point of view the patients demographic characteristic may increase the patient risk to admission in intensive care units.

The current study finding was accordance with Shahood et al., (2021) in their study titled “Strategies to Optimize ICU Liberation (A to F) Bundle Performance in critically ill patients” who reported that the mean age  $\pm$  of patients was  $47.66 \pm 14.56$  50years .

The current study displayed that less than half of patients were male. From view researcher attributed to men’s coping with stressful events less adaptive physiologically behaviorally & emotional contributing to their increased risk for readmission in ICU.

The current study revealed that, near three quarter of studied patients regarding past history & type of surgery, had previous chronic disease, and half of them had HTN, DM, two third of them had previous surgery. One third of them had heart valve repair. The researcher views, this result could be attributed to, job demands, physical work environment, lack of support and low socio economic condition.

This study result was in the same line with Golitaleb et al., (2021) in their study titled “ the ABCDEF Bundle to Life and Saving Lives Through the Process” who found that three quarter of studied patients had previous chronic disease, most critical ill patients suffering from HTN, DM, two third of them had previous surgery. Less than of them had heart valve repair.

Regarding duration of stay in the intensive care unit, frequency of admissions for care, duration of stay on mechanical ventilation and classification of weaning by duration ,the current study three quarter of them duration of stay in the intensive care unit  $\geq 1$  week, two third of patients frequency of admissions for care more than three times. One third three weeks of stay on mechanical ventilation, most of studied patients prolonged weaning more than 7 days, more than of patients had difficult weaning pre implement of educational program

From the researcher point of view not implemented the critical care bundles so effect on patients length stay, readmission and delayed in weaning.

This study result was in same line with choi et al.,(2021), in their study titled “ The ABCDEF Implementation Bundle in intensive care units” who reported the majority of studied patients were difficult weaning & prolonged stay on mechanical ventilation pre implement of the educational program

The current study was revealed that the studied patients regarding Patient Pain assessment: through using critical-care pain (CPOP) & behavior pain , that there was a highly statistically significance between the patients pain assessment, scoring system and indicator most of patients had sever pain pre and less of half had mild pain post program implementation ,due to the implementation of educational program effect the nurses performance to deliver quality of patient and enhancement patients outcomes .

In addition to pain was multifactorial and can be caused by critical illness, invasive treatment, and standard care procedures .Moreover, pain can induce stress responses that may play an important role in critical illness (e.g., tachycardia, polypnea, increased oxygen consumption), as well as long term psychological stress. Therefore, it was paramount that nurses and physicians be able to monitor and detect pain using valid tools, to titrate analgesic doses, minimise their overuse and serious side-effects, as well as to detect medical complications during ICU stay. Monitoring pain was associated with improved patients’ outcomes in ICU (e.g., decrease in sedative use, reduction of mechanical ventilation duration and length of stay).

Regarding assessment the patient ability the weaning through using wake up and breath protocol, their was a highly statistically significant differences between the patient’s ability of weaning include spontaneous a waking trials and spontaneous breathing trials after program intervention due to the critical care nurses recognize SAT safety screen criteria help monitor of critical ill patient and improve skills regarding implementation of bundle.

From viewpoint of researcher, when SAT and SBT are implemented in combination with other care package components, they decrease the duration of MV support, length of ICU stay and the incidence of delirium

The current study finding showed that two third of patients had assessment level of agitated competitive, very agitated, restless and deep sedation pre implementation of the program and most of them had assessment level of agitated competitive, very agitated, restless and alert and calm post implementation of the program and slightly decline in follow up phase with highly statistical significant that were highly significant differences between two scale used in agitated patient.

From view point of researcher developed with efforts of different practitioners, represented by physicians, nurses and pharmacists this effect on uses measure the agitation or sedation level of critical ill patient.

Concerning for total level of delirium more than half of studied patients had severe delirium in preprogram implementation & near of half had mild to moderate delirium post immediate program.

Form the researches view have revealed barriers such as the lack of understanding of the tools used for the assessment of delirium and difficulty in assessing intubated patients & uses the protocol delirium for critical ill patients enhanced the nurses to follow up the patients and reduce incidence of delirium and recommended that the curriculum of delirium care training offered in these programs or courses should focus mainly on the understanding and use of delirium assessment tools. It was especially important that the educational content related to delirium care was presented in line with the recommendations.

Regarding total scoring system regarding early mobility & exercise two third of the patients had dependent in pre implementation of the program ,while most of them had independence and independent in basic ADL in post implementation of the program and slightly decline in follow up phase with highly statistical significant .

This result was finding in the same line with Loscalzo et al., (2021), in their study titled "Perceived Barriers to Early Mobilization of Intensive Care Unit Patients by Nurses in Hospitals Affiliated to Jundishapur University of Medical Sciences of Ahvaz "who reported that major human-resource-related barriers for implement early mobility & exercise included the lack of trained staff, inadequate shift nurses, and inadequate time for this procedure and most patient dependent pre implementation of the program

Form the researches view point performing different range of motion exercises and changing patients positions are very essential nursing interventions required to enhance patients outcomes.

This result was finding the same line with Volsko et al., (2021), in their study titled "Clinical Attitudes and Perceived Barriers to Early Mobilization of Critically Ill Patients in Adult Intensive Care Units" who reported that early mobilization (EM) of Patients in Intensive Care Unit (ICU) is a safe, feasible, and beneficial approach. However, the implementation of EM as a part of routine clinical care can be challenging.

Regarding complication of critical ill patients theirs was highly statistical difference between pre, post & follow up phases of implementation of the program includes pneumonia, deep venous thrombosis and bed sores. The majority of patient had complications pre implementation of the program, two third of them had complication declined clearly post phases of implementation of the program.

Form the point view of researches immobility & length of stay in intensive care units enhance complications of pressure ulcer, pneumonia, deep vein thrombosis during hospitalization and the patients' health-related quality of life after discharge.

Other study was supported the current finding which conducted by Lei et al., (2021), in their the study titled "The association between major complications of immobility during hospitalization and quality of life among bedridden patients" who reported that among complication in intensive care units include: including pressure ulcer, deep vein thrombosis, pneumonia, and urinary tract infection and mortality.

Regarding Patient's length of stay, discharge, infections as pneumonia, mortality, critical-care pain observation score, safety screen for both SAT & SBT, delirium level, early mobility and exercise of care patients level, functional muscle strength level, activity level respectively and significant.

From the researches view point implementing of training program affect positively nurses competent practice level of and positive effect on patients outcomes to prevent complications in intensive care units.

Finally, the strategy of enhancing patient comfort through the goal-directed multidisciplinary, evidence based bundled approach improves clinical outcomes, and hence these guidelines recommend the implementation of the ABCDEF bundle for critical ill patients

## Conclusion

**Based on the finding of the current study, it can be concluded that:**

Implementation of critical care bundle affecting level among the patient's outcomes to outline the effective intervention & reduce complications in intensive care units, the critical care bundle (ABCDEF) represents an evidence-based guide for clinicians to approach the organizational changes needed for optimizing intensive care unit patient recovery and outcomes. The bundle has individual components that are clearly defined, flexible to implement, help empower multidisciplinary clinicians and families in the shared care of the critically ill. The ABCDE bundle is a set of evidence-based practices to systematically reduce the risks of sedation, delirium, and immobility in intensive care patients. Implementing the bundle improves clinical outcome (Marra et al., 2021).

## Recommendation

**Based On the current study finding:**

- 1) Conducting training program for the critical care nurses in intensive care units all hospitals to improve nurses performance regarding implementation of care bundle for critical ill patients.
- 2) Applying the protocols regarding implementation the critical care bundle in intensive care units to reduce complications of critical ill patients.
- 3) Providing critical care nurses with designed instructional Arabic booklet to ensure it is continuity implementation for critical care bundles in ICU.
- 4) Develop the policies, procedures for family engagement & determine family willingness to be actively participating in their patient care and the aspects of care they can be engaged in should be available.
- 5) Demonstrate future researches are recommended to examine factors affecting on the implementation of care bundle for critical ill patients.
- 6) Replication of the current study on large number of nurses in different setting for intensive care units of the study finding.

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