

Relation between Occupational Hazards and Nurses' Job Burnout at Intensive Care Units

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Abstract

Background: Intensive care units like other dangerous workplaces are characterized by a high amount of exposure to hazardous substances, which gravely threatens nurses' safety, stress and burnout. **Aim:** Assess the relation between occupational hazards and nurses' job burnout at Intensive Care Units. **Subjects and method: Design:** A descriptive correlation research study design. **Setting:** It conducted in intensive care units at Tanta university hospitals including, Tanta Main University Hospital and Emergency Hospital. **Subject:** All nurses (n=390) who were working in Tanta hospitals. **Tools:** Data were collected by using Occupational Hazards Structured Questionnaire and Nurses' Job Burnout Scale. **Results:** More than half (56.2%) of nurses perceived had moderate level of occupational hazards. Also, almost half (51.3%) of nurses had a low level of job burnout. **Conclusion:** There was a statistically significant positive correlation between occupational hazards and nurses' job burnout. **Recommendation:** Hospital administration create ICU hospitals policies and guidelines for safety practices. Hospital /unit managers should gain consciousness of the existence of burnout and thus to take corrective action to reduce its occurrence, nurses follow up the implementation of excellent care aspects in daily work to prevent workplace occupational hazards. Nurses conduct workshops on resolving stress and design strategies to improve and solve burnout among nurses.

Keywords: Intensive care unit, occupational hazards, job burnout, nurses.

Introduction

In hospital's intensive care units (ICU) is a key division. The ICU is a distinct culture, with sophisticated technology, it is a specialized unit that supplies care for critically ill patients. Hence, increasing influx of infected patients as a result ICUs put nurses under extreme tension ⁽¹⁾. Nurses in ICU are more susceptible to accidents and occupational hazards because of their work in the health-care sector. There are stressful considerations for intensive care unit's nurses as the frustration of not being able to successfully recover the patients, coping with the imminence of their death ⁽²⁾. The

intensive care unit environment is considered a crucial factor that affects the motivation and work satisfaction of nursing staff ⁽³⁾.

The intensive care unit nurses responsible for tasks related to patient care directly, that are most exposed to the physical workloads due to working conditions are hazardous in the ICU setting ^(2,3). The workplace environment must be considered carefully because it is affecting the inspiration and capability of ICU nurses to perform the tasks. There is evidence about the impact of poor work environments on ICU nurses and patient outcomes. Negative outcomes for the ICU nurses can be related to job satisfaction and burnout. However, there

are some other negative outcomes for the patients such as inadequate safety, impaired quality of care, medical errors and increased mortality⁽⁴⁾.

The ICU environment may cause a number of risks with regard to occupational hazards. The workplace hazards include the physical environment of the ICU such as lighting, conditioning, noise, equipment and workspace⁽⁵⁾. Working conditions such as daily workload, working in shifts, standing for long hours, caring for patients with comorbidities and inadequate income. Also, psychosocial factors such as dissatisfaction with work, workplace stress, often encountered deaths, interaction with families of patients and workplace violence. Ergonomic as factors repositioning the patients and repeating movements such as pushing, pulling, elevating and bending. As well as biological factors being exposed to infectious organisms during invasive and non-invasive procedures. Chemical factors being exposed to antiseptic and disinfectants or inhaling their gases⁽⁶⁾.

Nursing is a demanding profession that puts nurses under a lot of emotional and physical stress. There are numerous factors that increase the risk of physical and mental illnesses in nurses, as well as job burnout. ICU nursing teams may be characterized by ambiguity, fluctuating situations, and the need for speedy reaction, mandating prominent levels of knowledge, skill, and competence, as well as psychomotor, emotional, and cognitive control, all of which can contribute to tiredness, stress, and burnout⁽⁷⁾.

Burnout is one of the consequences of professional stress that is caused by chronic psychological stress brought on by an

imbalance between demands of the environment and individuals' ability to cope with these requirements. Burnout results from growing environmental expectations that nurses cannot oversee and the resulting psychological pressure⁽⁸⁾. Occupational burnout reduces patients' satisfaction due to their poor-quality services given. Therefore, recognizing burnout and preventing it enhances both the staff's mental health and the standard of the services offered. It is characterized by the reaction to ongoing interpersonal and emotional triggers of stress at work, which affect many health professionals⁽⁹⁾.

Burnout is a multifaceted idea that includes emotional exhaustion, a decline in personal accomplishment, and depersonalization of others. Professionals may feel more frustrated and tense due to emotional exhaustion, which is accompanied by a lack of energy and enthusiasm, fatigue, and a sensation of having drained up all their emotional resources in dealing with the challenging circumstance⁽¹⁰⁾. The decline in personal accomplishment is a sensation of diminishing abilities and frustration with a person's achievements and successes at work, as well as growing unhappy and dissatisfied with their professional development. As a result, one's sense of competence and success declines as does one's ability to interact socially. Depersonalization is the term for negative attitudes, insensitivity, and lack of regard for other people that cause professionals to treat their patients, colleagues, and coworkers inhumanely⁽¹¹⁾.

The strenuous nature of providing patient care in an intensive care unit taxed the body and mind of the nurses. Patients hold nurses

in high regard, yet it is possible that they lack the resources or authority to fulfil all the demands placed upon them ⁽¹²⁾. The burnout syndrome is especially pronounced in nursing professions because of demand, workload, multiple shifts, occupational hazards, precariousness of material resources, shortage of qualified nurses, and conflictual interpersonal interactions. The gradual exposure to various stressors causes physical and mental tiredness, impairing living quality as well as the interaction with their functions and the workplace which triggers the medical condition. Burnout can cause a wide range of physical, psychological, and cognitive symptoms, necessitating prolonged adaptive responses including overcoming, tolerating, or adjusting to stressors, which can undermine the person and the organization and cause the burnout syndrome ⁽¹³⁾.

Significance of the Study

Occupational hazards management have become the primary focus of healthcare development. Nurses are prone to occupational hazards in the intensive care unit of their day-to-day care that is provided to severally ill patients ⁽¹⁴⁾. So, the occupational hazards management have highlighted the hazards that nurse face when providing health care for comatose and sever ill patients that may effect on patient's outcome ⁽¹⁵⁾. Furthermore, hazards have a negative impact on nurses' quality of life, with economic consequences in terms of costs of treatment and with potential for lost days of work. Whereas, unsafe workplace not only can lead to nurses' job burnout and decreased job satisfaction, but also affects patient outcome and increases the cost of treatment ⁽¹⁶⁾. In light of a previous study,

the examination of the relation between work hazards among nurses and factors affecting their productivity was recommended ⁽¹⁷⁾. Moreover, another study concluded that investigating the area of nurses' job is necessary to prevent it ⁽¹⁸⁾. So, this study needs to be addressed to assess occupational hazards and its effect on job burnout among intensive care nurses.

The aim of study is to

Assess the relation between occupational hazards and nurses' job burnout at Intensive Care Units.

Research Questions:

1. What are the levels of occupational hazards and nurses' job burnout at Intensive Care Units?
2. What are the relations between occupational hazards and nurses' job burnout at Intensive Care Units?

Subjects and method

Study design

A descriptive correlation research study design was used in the present study.

Study setting

The present study was conducted in intensive care units at Tanta University Hospitals including Tanta Main University Hospital and Emergency Hospital. Main University Hospitals include the following units: Medical Care Unit, Cardiac Care Unit, Ophthalmology Anesthesia Care Unit includes Chest Care Unit, Neonates Intensive Care Units and Pediatric Intensive Care Unit. The Emergency Hospitals includes Trauma of Emergency Car Unit, Anesthesia Care Unit and Neurological care unit.

Subject

All convenience sample of nurses(n=390) who were working in Tanta University

Hospitals, Main University Hospital contained nurses (n=243) and Emergency University Hospital contained nurses (n=147) were included in the present study the previously mentioned setting.

Tools of data collection

To achieve the aim of study, the following tools were used.

Tool I: Occupational Hazards Structured Questionnaire

This tool was developed by the researcher guided by Souza et al. (2017)⁽¹⁹⁾ Thangaraj (2017)⁽²⁰⁾ and recent related literature to assess the levels of occupational hazards in intensive care units. It was consisted of two parts as follows:

Part 1: Personal characteristics of nurses such as age, years of experience, department, marital status and qualification.

Part 2: Occupational hazards Questionnaire. This part included six subscales as follows:

- Hazards related to physical environment 10 items.
- Hazards related to working conditions 4 items.
- Psychosocial hazards 11 items.
- Ergonomic hazards 5 items.
- Biological hazards 12 items.
- Chemical hazards 9 items.

Scoring system

Nurses' responses were measured on three points Likert Scale ranging from (1-3) where always =3, rarely=2 and never=1.

The total score was calculated by summing of all categories and high score indicated high level of occupational hazards based on cut off value as follows:

- High level of occupational $\geq 75\%$.
- Moderate level of occupational hazards 60% - <75%.

- Low level of occupational hazards <60%.

Tool II: Nurses' Job Burnout Scale

This tool was developed by Maslach (1996)⁽²¹⁾ was modified by Lim et al. (2019)⁽²²⁾ and adapted by the researcher to assess nurses' job burnout. This tool included three subscales as follow:

- Emotional exhaustion 9 items.
- Depersonalization 5 items.
- Personal achievement 8 items.

Scoring system

Nurses' responses were measured on a five-points Likert Scale ranged from (1-5) where never = 1, a few times a year or less =2, once or a few times a month =3, once or a few times a week =4, and every day =5. The total scores calculated by summing of all categories into levels of nurses' job burnout as follows:

- High level of nurses' job burnout $\geq 75\%$
- Moderate level of nurses' job burnout 60% - <75%,
- Low level of nurses' job burnout <60%.

Method

1. Official permission to conduct the study was obtained from the Dean of Faculty of Nursing to Tanta University Main Hospital and submitted to the responsible authorities of the selected setting.

2. Ethical consideration:

- a) Approval of Ethical Committee obtained of Faculty of Nursing.
- b) Nature of the study was not causing any harm or pain to the nurses.
- c) Nurses consent to participate in the study obtained after informed them about the privacy of information, nature of the study, their right to withdraw and confidentiality of their data.
- d) Confidentiality and privacy were taken into construction regarding data collection.

3- Tools I and II were translated into Arabic and presented to a jury of five experts in the area of specialty to check their content validity and clarity of questionnaire.

– The face validity value of tool (I) part 2: Occupational Hazards Structured Questionnaire 90.37%, tool (II) part 1: Nurses' Job Burnout Scale 97.95%.

4. Reliability of tools was tested using Cronbach Alpha Coefficient test. Reliability of tool (I) part (2): Occupational Hazards Questionnaire were reliable was 0.748 and reliability of tool (II) part (2): Nurses' Job Burnout Scale were reliable was 0.818.

5. A pilot study was carried out on a sample (10%) of nurses (n=39) nurses, and they excluded from the main study sample during the actual collection of data. The pilot study was done to test clarity, sequence of items, applicability, and relevance of the questions and to determine the needed time to complete the questionnaire. The estimated time needed to complete the questionnaire items from nurses was (20 -30) minutes.

6. Data collection phase: the data were collected from nurses by the researcher. The researcher met the respondents' nurses in different areas under study during working hours to distribute the questionnaire. The subjects recorded the answer in the presence of the researcher to ascertain that all questions were answered. The data was collected over a period of two months started from October 2021 until December 2021.

Results

Table (1): Represents percentage distribution of nurses' personal characteristics. It was noticed that the age of nurses ranged between 20 to 45 years old, with a mean age 29.83 ± 7.33 , where two

thirds (60.8%) of nurses were less than 30 years old. The majority (90.3%) of nurses were female. Regarding their hospital the table shows that 62.3% of nurses were distributed in Main hospital and 37.7% of them were distributed in Emergency hospital.

Regarding their departments the table shows that 22.8% and 15.4 % of nurses were distributed in Neonates ICU and Anesthesia ICU respectively. Also, 13.6% and 13.3% of them were distributed in Medical ICU and Neurological ICU respectively. More than half (52.1%) of nurses had Bachelor Nursing Degree, more than one third (39.7%) of nurses had Nursing Technical Deplume, only 3.3% and 4.9% of them had Diploma Nursing Degree and Postgraduate degree respectively. Around two thirds 63.1% of nurses had <10 years of experience with mean 6.26 ± 4.18 . Additionally, a high percentage (65.9%) of nurses were married.

Figure (1): Demonstrates overall nurses' perception regarding occupational hazard. This figure revealed that more than half (56.2%) of nurses had a moderate level of perception about occupational hazards and one third (32.6%) of them had low level perception about occupational hazards. While a minority (11,2%) of them had a high level of perception regarding their occupational hazards.

Table (2): Demonstrates levels of nurses' perception regarding occupational hazards dimensions. The table was clear that almost half (50.0% and 47.4%) of nurses perceived moderate levels about chemical and physical hazards respectively. Also, a high percent and more than half (86.2% and 54.6%) of nurses perceived low their level about biological hazards and working conditions

respectively. Also, around three quarters and more than half (77.7% and 56.9%) of nurses perceived a high level about ergonomic and psychosocial hazards respectively.

Figure (2): Demonstrates overall nurses' perception regarding levels of job burnout. As evident from the figure, more than half (51.3%) of nurses had a low level of job burnout and more than one third (35.4%) of nurses had a moderate level of job burnout. While a minority (13.3%) of them reported that they had a high level of job burnout.

Table (3): Displays nurses' job burnout dimensions. This table clears that nearly three quarters and more than half of nurses (70.5% and 54.1) perceive high levels about their emotional exhaustion and personal

accomplishment respectively. Also, most nurses (86.4%) believe had a low level of depersonalization.

Table (4): Represents correlation between occupational hazards and job burnout dimensions among nurses. As noticed from this table that overall occupational hazards and overall burnout had positive statistically significance. Also, all dimensions of job burnout had statistically significant correlation with all dimensions of occupational hazards except between ergonomic and chemical hazards with depersonalization and working condition with personal accomplishment as perceived by nurses and r ranged between 0.134 and 0.306 at $p < 0.001$.

Table (1): Percentage distribution of nurses' personal characteristics (n = 390)

Demographic data	nurses	
	No	%
Age		
<30	237	60.8
30 – 45	149	38.2
>45	4	1.0
Min – Max	20.0 – 48.0	
Mean ± SD.	29.83 ± 7.33	
Median	28.0	
Gender		
Male	38	9.7
Female	352	90.3
Hospital name		
Main	243	62.3
Emergency	147	37.7
Unit name		
Trauma of Emergency ICU	35	9.0
Anesthesia ICU	60	15.4
Medical ICU	53	13.6
Neurological ICU	52	13.3
Cardiac ICU	25	6.4
Ophthalmology Anesthesia ICU	20	5.1
Chest ICU	16	4.1
Neonatal ICU	89	22.8
Pediatric ICU	40	10.3

Educational qualification		
Bachelor of Nursing	203	52.1
Nursing Technical Deplume	155	39.7
Technical Secondary School		3.3
Diploma in Nursing	319	4.9
Postgraduate degree		
Years of experience in nursing		
<10	246	63.1
≥10	144	36.9
Min – Max	1.0 – 21.0	
Mean ± SD.	6.26 ± 4.18	
Median	5.0	
Marital status		
Married	257	65.9
Unmarried	125	32.1
Divorced	8	2.0

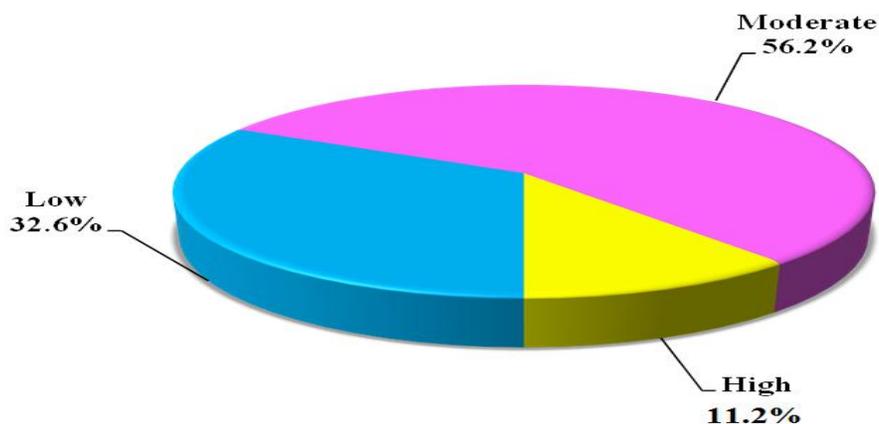


Figure (1): Overall nurses' perception regarding occupational hazard

Table (2): Levels of nurses' perception regarding occupational hazard dimensions (n= 390)

Occupational hazards dimensions	nurses' perception					
	High		Moderate		Low	
	No	%	No	%	No	%
Physical hazards	161	41.3	185	47.4	44	11.3
Working condition	54	13.8	123	31.6	213	54.6
Psychosocial hazards	222	56.9	116	29.7	52	13.4
Ergonomic hazards	303	77.7	37	9.5	50	12.8
Biological hazards	32	8.2	22	5.6	336	86.2
Chemical hazards	74	19.0	195	50.0	121	31.0
Overall occupational hazards	44	11.2	219	56.2	127	32.6

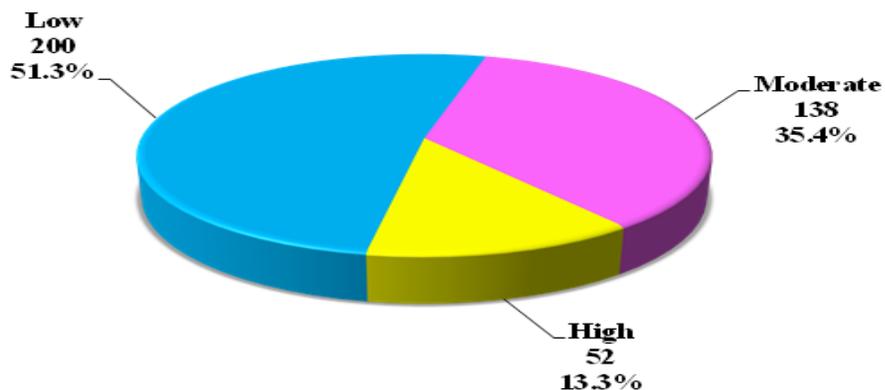
**Figure (2): Overall nurses' perception regarding levels of job burnout.**

Table (3): Nurses perception regarding job burnout dimensions (N=300)

Job burnout dimensions	nurses' perception					
	High		Moderate		Low	
	No	%	No	%	No	%
Emotional Exhaustion	275	70.5	51	13.1	64	16.4
Depersonalization	15	3.9	38	9.7	337	86.4
Personal Accomplishment	211	54.1	21	5.4	158	40.5

Table (4): Correlation between occupational hazards and job burnout dimensions among nurses (n= 390)

Occupational hazards dimensions	Job Burnout dimensions							
	Emotional Exhaustion		Depersonalization		Personal Accomplishment		Overall burnout	
	R	P	R	P	R	P	r	P
Physical hazards	0.209*	<0.001*	0.222*	<0.001*	0.164*	0.001*	0.306*	<0.001*
Working condition	0.109*	0.031*	0.292*	<0.001*	-0.016	0.746	0.134*	0.008*
Psychological hazards	0.175*	0.001*	0.116*	0.022*	0.210*	<0.001*	0.290*	<0.001*
Ergonomic hazards	0.274*	<0.001*	0.088	0.081	0.147*	0.004*	0.288*	<0.001*
Biological hazards	0.251*	<0.001*	0.145*	0.004*	-0.022	0.669	0.163*	0.001*
Chemical hazards	0.130*	0.010*	0.026	0.612	0.116*	0.021*	0.168*	0.001*
Overall occupational hazard	0.292*	<0.001*	0.200*	<0.001*	0.152*	0.003*	0.335*	<0.001*

r: Pearson coefficient * : Statistically significant at $p \leq 0.05$

Discussion

Occupational hazards are one of the most serious dangers that nursing in ICU face daily duty. However, nurses encounter a variety of occupational hazards. ICU burnout is a communal problem that has gained increasing attention within the last few years because it has been associated with personal suffering, absenteeism, turnover, major medical errors, and lower patient satisfaction⁽²³⁾.

The present study results revealed that more than half of nurses had a moderate level of overall occupational hazards. These findings may be interpreted by two thirds of nurses aged under thirty years and had years of experience less than ten years. Additionally, the nature of the intensive care unit work environment is stressful and included more hazardous that expose nurses to danger during their work. Also, nurses worked long shifts with repetitive movements in lifting and aiding critically ill patients that effect on nurses' safety. The same result found by **Şanlıtürk (2021)**⁽²⁴⁾, **Zarrini et al. (2018)**⁽²⁵⁾ and **Ghahremani et al. (2018)**⁽²⁶⁾ they reported that the level of occupational hazards for the nurses in the ICUs was moderate. Also, **Elewa and El Banan (2016)**⁽²⁷⁾ on their study notice that there is a high level of exposure to occupational hazards. In contrary, the current study disagreed with **Shamkh et al. (2022)**⁽²⁸⁾ they confirmed that about three quarter of nurses have a low level of occupational hazards among nurses. They found that two thirds of nurses have years of experience or more than fifteen years.

In the present study revealed that the majority of nurses were highly or moderately exposed to physical hazards.

These results may be due to nurses being exposed to radiation that led to fetal malformation which affects. When nurses transported patients to another department, they were exposed to physical hazards from aggressive relatives. Also, there is a shortage of staff and nurses' aids considered a main cause of physical hazards. On the line with this study **Umoh (2020)**⁽²⁹⁾ and **Yesilgul et al. (2018)**⁽³⁰⁾ their results revealed that physical hazards were considered moderate among nurses. Also, similarity of the current study **Elbilgahy et al. (2019)**⁽³¹⁾ who reported that a high incidence rate of physical hazards among nurses, this was biggest issues as these hazards were identified by more than three quarters of nurses.

The present study results show that half of nurses had a low level of job burnout and around a third of them had a moderate level. This finding may be due to nurses handling and dealing very calmly with their work problems in the present of excessive workload in ICU, and different hazards especially ergonomic and psychosocial hazards. Furthermore, nurses had a prominent level about their emotional exhaustion and personal accomplishment, but they had low level of depersonalization. The findings are in line with the study of **Durand et al. (2019)**⁽³²⁾ who revealed that the majority of nurses have low level of job burnout. Also, **Nassar et al. (2019)**⁽³³⁾ who clarified that ICU nurses and trainee interactions demonstrated low level of burnout. Also, **Nogueira et al. (2018)**⁽³⁴⁾, **Sillero (2018)**⁽³⁵⁾ and **Mazhar et al. (2019)**⁽³⁶⁾ who found that the degree of general nurses' burnout was moderate. This result is contraindicated with **Friganović et al.**

(2019) ⁽³⁷⁾ and **Abbas et al. (2019)** ⁽³⁸⁾ results who find high level of job burnout. Their results were high due to factors as work-life imbalance, long work hours, perceived workload, distress caused by complaints and lack of reciprocity in relationships with patients may lessen satisfaction and consequently increase the risk of burnout. Also, **Wilson et al. (2017)** ⁽³⁹⁾ revealed nurses' perception was high to a moderate level of burnout.

The findings of the presents study reflected that nurses perceive highly statistically significant found between overall work occupational hazards and overall their job burnout. This means that nurses' job burnout due to present of work occupational hazards. This result may be due to stressful work environment of ICU, long work hours and their emotional strain from patient care. Also, critical care nurses practice in units where patients require more complex interventions. In the line with the result of this study, **Du Peihong and Li et al. (2021)** ⁽⁴⁰⁾, **Saravanabavan et al. (2019)** ⁽⁴¹⁾ and **Lee CY (2019)** ⁽⁴²⁾ who revealed that there was a highly statistically significance relation between nurses' overall of occupational stress and overall of their job burnout. They clarified that nurses' occupational hazards and their job burnout are also mutually interactive. Also, **Nantsupawat et al. (2016)** ⁽⁴³⁾ revealed that there was a relation between occupational stress and job burnout among ICU nurses. Moreover, different ICU occupational hazards as a factor may lead to different health problems and a reduced quality of life.

Conclusion

In light of the current study findings, it can conclude that more than half of nurses had perceived moderate level of overall occupational hazards, and almost half of nurses had perceived low level of job burnout in ICU at Tanta University Hospitals. Moreover, there was a statistically significant positive correlation between overall occupational hazards and overall nurses' burnout.

Recommendations

On the line of the finding of the current study the following recommendation are suggested:

For hospital administration

1. Creation and dissemination of ICU hospitals policies and guidelines for safety practices.
2. Establish continuous training programs about occupational hazards for ICU nurses, especially protective measures.
3. Organizational interventive programs for preventive to take avoiding action and reduce burnout syndrome in ICUs.
4. Hospital /unit managers should gain awareness of the existence of burnout and thus take corrective action to reduce its occurrence.

For nurses

1. Participate in training programs to update ICU nurses' knowledge and practice about occupational hazards.
2. Follow up the implementation of quality care dimensions in daily work to prevent workplace occupational hazards.
3. Involve in solving unit problems to improve their depersonalization and facilitate its applicability.

4. Creating an appropriate work environment that prevents conflict among nurses and encourages a more productive and constructive environment.

Further research to be conducted.

Assess organizational strategies to improve occupational hazards training program knowledge.

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