Nurses Knowledge and Practice Regarding Infection Control Measures in Intensive Care Units

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ABSTRACT

Background: Patients in intensive care units frequently get infections. Adhering to infection control measures is the only method to safeguard healthcare personnel, patients, and the public against outbreaks acquired in hospitals. **Aim** of the study was: to assess nurses' knowledge and practice regarding infection control measures. Determined human resources that affect the application of infection control measures. **Subjects and Method**: **Design**: A descriptive research design was utilized. **Setting**: In universal insurance hospitals at the port-said city. **Subjects**: The study's participants were all nurses(174) who worked in intensive care units. **Tools**: includes the Nurses' Knowledge Questionnaire, the Nurses' practice Checklist regarding the application of infection control, and the human resources that affect the application of infection control measures. **Results**: In this study, (89.1%) of nurses had a satisfactory level of knowledge, (80.5%) of nurses had a satisfactory level of practice, and all ICUs participating in the study (100%) had a satisfactory level of infection control measures (70%) unsatisfactory human resources. **Conclusion:** Although the current study demonstrated a satisfactory level of knowledge, practice, and infection control measures for the application of infection control measures in intensive care units, the human resources are unsatisfactory. And statistical significant relation between nurses knowledge and practice. **Recommendation**: Plan for continuous education regarding infection control measures and updating knowledge and practice

Keywords: *Infection control measures, Intensive care units, Knowledge, Practice.*

INTRODUCTION

An essential part of providing secure and high-quality services at the facility level is infection prevention and control. The only approach to lessen her exposure to healthcare-associated infections(HAIs) and avoidable damage to patients, health care workers (HCWs), and the community is to strictly adhere to infection control procedures. Additionally, several complicating factors, such as adequate knowledge of infection control, accessibility to personal protective equipment and materials, human resources, training, policies and guidelines, and fundamental environmental hygiene requirements, all play a significant role in achieving the goals of infection prevention (Sahiledengle, Gebresilassie, Getahun & Hiko, 2018).

Local or systemic illnesses (conditions) brought on by pathogens or toxins that weren't present before a patient was admitted to a hospital or other healthcare institutions are known as nosocomial infections (Custovic, Smajlovic & Dzafic, Hatching, 2020). For every 100 patients, there are seven suspected nosocomial illnesses from industrialized countries and ten from underdeveloped regions, according to the World Health Organization (WHO) (Nimer, 2022). Additionally, 15% to 20% of critically sick patients can develop difficulties from nosocomial infections, which are more common in intensive care units (ICU) (Mukhopadhyay, 2018).

One of the most critical specialty departments is the intensive care unit. Despite only having 5–15% of the hospital's beds, this ward has seen up to 30% of all nosocomial infections, which is 2–5 times more than other wards, making it a crucial area (Hormozi, Saeedi, Aminianfar, Alishah & Darvishi, 2018).

Nurses contribute significantly to infection prevention and control by using standard precautions and maintaining a healthcare environment. By applying their knowledge, skills, and judgment to initiate appropriate and prompt infection control procedures, all nurses, in all positions and situations, may provide leadership in infection prevention and control. The creation of training programs for nurses should also be under the supervision of a committee, which should be constituted. Keep an eye on how infection control methods are being used (Salem, 2019).

Protective practices are influenced by the understanding of the regulations, management support, communication about regulations, availability of resources, the

perceived value of following instructions, comfort with personal protective equipment (PPE), perceived impact of PPE on patients, and workplace culture, according to health care workers' perceptions of what influences adherence to guidelines during an outbreak of infection (Brooks, Greenberg, Wessely, & Rubin, 2021).

Significance of the Study

The most frequent adverse medical occurrence, healthcare-associated infections (HAIs) are linked to higher rates of morbidity and mortality, longer hospital admissions, increased antibiotic resistance, a greater burden on the healthcare system, and continuous financial losses (Barbato, et al., 2019). The cornerstone of preventing infection from spreading during treatment is infection prevention and control. Inevitably, biological attacks result in the need to treat sick people, placing a load on the healthcare system and emphasizing the significance of infection management (Popescu, 2019). This research investigation is crucial for preventing infections in hospitalized patients and for figuring out what helps and what hinders healthcare professionals from following IPC regulations. As a result, this study is being done to evaluate the variables that affect ICU nurses' usage of infection control strategies.

AIM OF THE STUDY WAS TO:

1. Assess nurses' knowledge regarding infection control measures in intensive care units.
2. Assess nurses' practice regarding the application of infection control measures in intensive care units.
3. Determined human resourses that affecting the application of infection control measures..

SUBJECTS AND METHOD

Subjects and Method

Subjects and method for this study were portrayed under four main designs as follows:

I- Technical design:

The technical design includes the research design, study setting, subjects, and tools for data collection.

Study design:

A descriptive study design was utilized fo the current study.

Study setting:

The following hospitals participated in the study: Al Hayat hospital, which has one ICU with 8-bed; Al Salam hospital, which has two ICUs (10-bed and 7-bed ICUs); and Al-Tadamon hospital, which has three ICUs (7 beds). Al Nasr Hospital has 2 intensive care units (8 beds and 5 beds), Al Mobala Hospital has a 10-bed ICU, and Al Zohor Hospital has a 10-bed ICU.

Study subjects:

A convenience sample of All available nurses (174) at list one year experience in ICU. The total numbers was (174) nurse collected as the following, 21 nurse from Al Hayat Hospital, 27 nurse from Al Salam Hospital, 46 nurse from Al Tadamon Hospital, 25 nurse from Al Mobara Hospital, 30 nurse from Al Nasr Hospital and 25 nurse from Al Zohor Hospital.

Tools of data collection:

Three tools were used for data collection. It was adopted by (Mohamed, El. Senousy & Abdel Rahman, 2015).

Tool(I): Nurses' knowledge assessment questionnaire.

To assess nurses' knowledge concerning infection control measures. It consists of 2 parts

part1: Demographic characteristic of nursing staff four closed ended question (age, sex, qualifications & experience).

Part 2: Knowledge of infection control measures used in intensive care units is included for the nursing staff. It included true and false questions as well as multiple choice questions (MCQ) that tested knowledge of the nature of infection and the chain of infection, the use of standard infection control precautions, the use of personal protective equipment, hand hygiene, cleaning, disinfection, and sterilization, needle stick management, and waste management.

The scoring system for nurses' knowledge regarding infection control measures

Each correct answer received (one) mark, and the incorrect response received answer received (zero).

It was considered that:

- ≥ 70% was a satisfactory level of knowledge
- < 70% was an unsatisfactory level of knowledge

Tool II. Nurses' Observational checklist:

It consists of twelve elements and evaluates how nurses application of infection control strategies in their daily work. Hand hygiene, wearing personal protective equipment, aiding with the insertion of peripheral venous catheters, maintaining peripheral venous catheters, preparing intravenous fluids and medications, administering injectable medications, aiding with the insertion of central venous catheters, handling the insertion of urinary catheters and nasogastric tubes, managing laundry and waste managment, and cleaning medical equipment are all examples of things to consider.

The Scoring system for the observation checklist:

The practice received a total of (75) points. Each correct application received (one) mark, whereas incorrect applications received (zero).

It was considered that:

≥ 70% was a satisfactory level of practice when the total mark was ≥ 52 mark.

< 70% was an unsatisfactory level of practice when the total mark was < 52 mark.

Tool III. Resources questioner that affecting the applicationof infection control measures in intensive care units

To assess human resources applied in the intensive care units. The tool was consist of 3 items include(working staff, non working staff, and visitor).

Scoring system for questioner that affecting the applicationof infection control measures:

The total score of the application was (22) marks. Each correct application was given (one) mark and the incorrect application was given (zero).

It was considered that:

- ≥ 70% was a satisfactory level of the application when the total mark was ≥ 114 mark.
- < 70% was an unsatisfactory level of the application when the total mark was < 114 mark.

II- Operational design:

The operational design includes the preparatory phase, content validity, reliability, pilot study, and field of work.

- Preparatory phase:

This entails a review of the relevant and recent literature on the research topic utilizing all official websites, including PUBMED, GOOGLE SCHOLAR, the MEDLINE database, CINAHL, the EBESCO Cochrane database, Scopus, journals and articles, and a number of other concerns. It comprises a variety of studies, periodicals, and magazines, as well as theoretical information on a variety of topics.

Validity

Content validity was conducted to determine whether the tools cover the aim of the study. The testing was developed by a jury of 7 experts from different academic categories (professors and assistant professors) of medical-surgical nursing at the Faculty of Nursing, Ain Shams University. The expertise reviewed the tools for clarity, relevance, comprehensiveness, simplicity, and applicability; minor modification was done.

Reliability:

Evaluation the internal consistency of produced instruments for reliability, the Cronbach alpha coefficient was determined. Tool I's reliability score was (0.828). Additionally, Tool II (0.929). Tool III (0.870).

Pilot study:

Before beginning data collecting, a pilot study was carried out with 10% of the sample size. 18 intensive care unit nurses from his six hospitals that are a part of the universal healthcare system participated in the study, but they weren't included in the entire sample to ensure consistency of results. Performed at the start of January 2021. The goal of the pilot study is to assess the research tool's accessibility, applicability, and feasibility, determine how long it will take to complete, and pinpoint any obstacles to issues that might develop during data collecting. to be done The results of the pilot research were taken into account when necessary revisions were made.

Fieldwork:

Researchers went to the study location, spoke with qualified nurses, described the goal of the study, and got each chosen nurse's verbal approval to take part in it. The six-month period from the middle of January 2021 to the end of June 2021 saw the collection of data. On two days a week, during the morning and evening shifts, data were gathered using each nurse's instrument. Her ICU nurse was given a knowledge assessment tool, and researchers also gathered practice data and human resources checklist. The 174 nurses came from six of her facilities that were connected to the Universal Health Insurance Hospital in Port

Said. Researchers checked each component of each item when it was finished to make sure nothing had been missed.

III- Administrative design:

Prior to conducting the study, the Dean of the Nursing Department officially wrote to the Director of the Universal Health Insurance Hospital in Port Said and to the directors of each hospital to request their participation and approval. after outlining the aim.

Ethical considerations:

The Faculty of Nursing's relevant committee gave its approval to the research proposal No(23) with a date 17/11/2020. The researcher gave the hospital director of the universal health insurance hospital an explanation of the study's goals and received formal approval to proceed. The nurses verbally agreed to participate in the study prior to the interview after being briefly briefed on its goals in order to gain their cooperation. They were also made aware of their veto powers by the researchers. All information gathered will be kept confidential and utilized solely for research, and care will be taken to ensure that the process does not disrupt the flow of the job.

IV- Statistical Design:

The gathered information was arranged, classified, and condensed into tables with columns for frequency, distribution and percentage, mean, and standard deviation. Utilizing the Social Science Program Statistics Package (SPSS) package version 22.0, statistical analyses were carried out on a computer. The software was the proper version to address the research objectives.

RESULTS

Results show that studied nurses (91.4%) were in age from 20 to 29 years old with a mean of 26.488 ± 4.195, (75.9%) of them were females, (65.5) had nursing institution education, (67.8) had less than five years of experience.

Figure(1): This figure clarifies that the majority of nurses under the study (89.1%) had a satisfactory level of knowledge regarding infection control measures.

Figure (2): This figure clarifies that studied nurses (80.5%) had a satisfactory level of practice regarding the application of infection control measures.

Table (1): This table shows that studied nurses (91.4%) were in age group from 20 to 29 years old with mean 26.488 ± 4.195, (75.9%) of them were females, (65.5) had nursing institute education, (67.8) had less than five years of experience.

Table (2): concludes that 89.7% of studied nurses had satisfactory knowledge regarding personal protective equipment, needle stick management, and knowledge of waste management, followed by the application of standard precautions of infection control, hand hygiene, cleaning, disinfection, and sterilization(83.9%,60.3% &68.4%) respectively. Whereas, the unsatisfied knowledge had nature and chain of infection (56.3%).

Table (3): Clarifies that the majority of the nurses' satisfactory practice of infection control measures were for cleaning of medical instruments, assistance in the insertion of a central venous catheter, linen management, and Waste Management (100%, 98.3%, 93.7%& 88.5%) respectively. Whereas, the Un satisfactory practice was the preparation of intravenous fluids and medications, hand hygiene, personal protective equipment, and handling urinary catheters (64.9%, 63.8%, 61.8%& 58.6%)respectively.

Table (4): This table shows that statistically significant relation between the total nurses' knowledge and the total nurse's practice of the studied sample.

Table (5): This table showed that human resources in intensive care units (70%) unsatisfactory were factors affecting the application of infection control measures in critical care units.

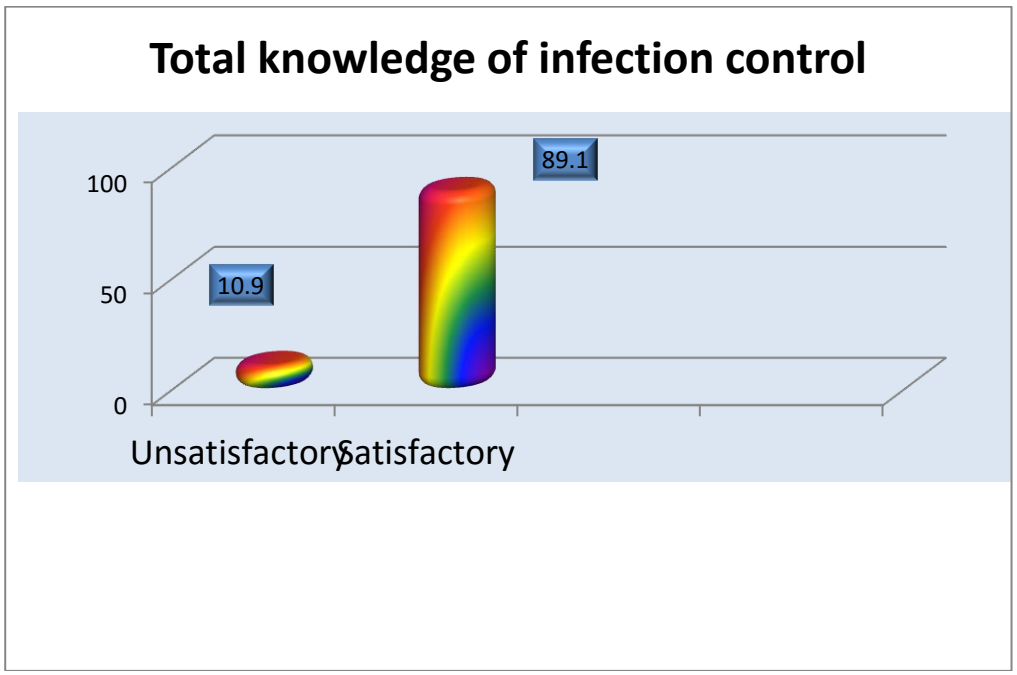

Figure 1:*Total knowledge of studied nurses regarding infection control measures*

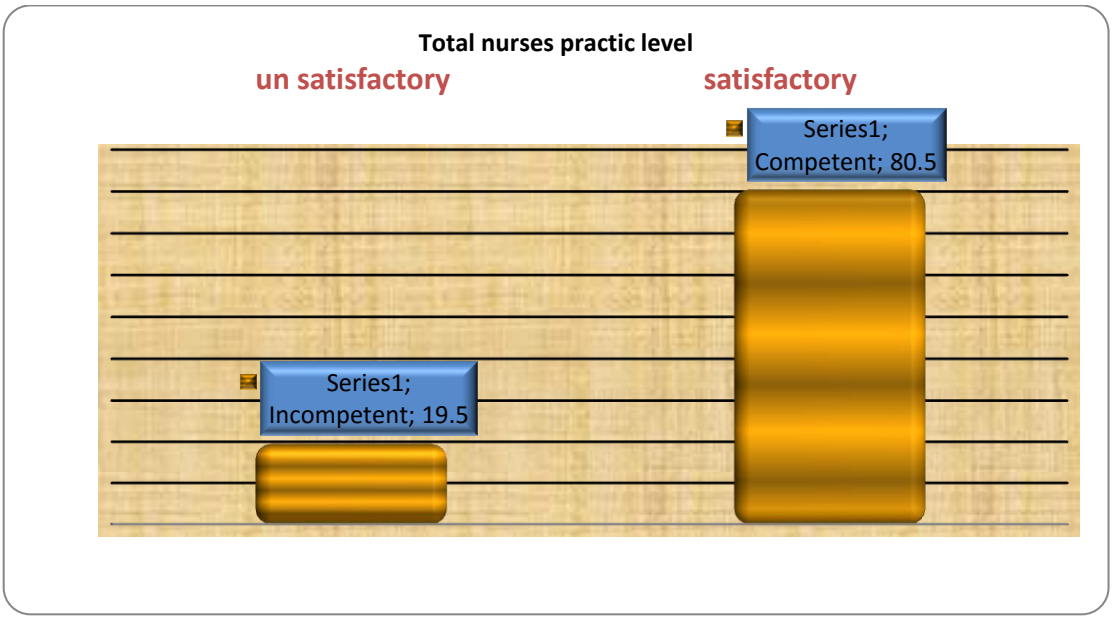

Figure 2: *Total* practice *of studied* nurses *regarding the application of infection control measures* levels.

Table (1): The demographic characteristics of the studied nurses (N=174).

Characteristics	No	%
Age group • 20 : 29 years • 30: 39 years • ≥ 40 years	 159 12 3	 91.4 6.9 1.7
Mean ± SD	26.488 ± 4.195	
Sex • Female • Male	 132 42	 75.9 24.1
Educational level • Technical secondary school of nursing • Nursing institute • Bachelor of Nursing	 13 114 47	 7.5 65.5 27
Years of experience • Less 5 years • 5 >10 years • 15>20 years • More than 20 years	 118 46 8 2	 67.8 26.5 4.6 1.1

Table (2): Total knowledge of studied nurses regarding infection control measures (N=174)

Total knowledge score of	Un satisfactory		Satisfactory	
	NO	**%**	**NO**	**%**
Nature and chain of infection	98	56.3	76	43.7
The application of standard precautions for infection control	28	16.1	146	83.9
The personal protective equipment	18	10.3	156	89.7
Hand hygiene.	69	39.7	105	60.3
Cleaning, disinfection, and sterilization.	55	31.6	119	68.4
Needle stick management.	18	10.3	156	89.7
Knowledge of waste management.	18	10.3	156	89.7

Table (3): Total practice of studied nurses regarding the application of infection control measures (N= 174).

Items	Un satisfactory		satisfactory	
	No	%	No	%
Hand hygiene	63	36.2	111	63.8
Personal protective equipment	67	38.5	107	61.5
Assistance in the insertion of the peripheral intravenous catheter	22	12.6	152	87.4
Maintenance of peripheral intravenous catheter	60	34.5	114	65.5
Preparation of intravenous fluids and medications	61	35.1	113	64.9
Administration of injectable medications	23	13.2	151	86.8
Assistance in the insertion of a central venous catheter	3	1.7	171	98.3
Handling urinary catheter	72	41.4	102	58.6
Nasogastric tube feeding	57	32.8	117	67.2
Linen management	11	6.3	163	93.7
Waste management	20	11.5	154	88.5
Cleaning of medical instruments	0	0	174	100

Table 4: The relationship between Knowledge and practice among studied nurses N=174

Category	R	*P*
Total knowledge &total practice	-0.095	0.043*

Table 4: Human resources affecting the application of infection control measures in critical care units(N= 174)

Items	No		Yes		N/A	
	No	%	No	%	No	%
Working staff:						
All staff are committed to do not eating or drinking in the unit.	6	60	4	40	0	0
Non working staff:						
Street coats and white coats are removed on entering the critica	6	60	4	40	0	0
Wearing special footwear before entering critical care unit.	7	70	3	30	0	0
Hands are washed on entering the critical care unit.	6	60	4	40	0	0
Hands are washed before leaving the unit.	6	60	4	40	0	0
Visitors						
Staff assess visitors for communicable disease (eg, rash, respiratory infection) before permitted to enter unit.	9	90	0	0	1	10
Street coats and white coats are removed on entering the critica care unit.	9	90	0	0	1	10
Wearing special footwear before entering critical care unit.	9	90	0	0	1	10
Forbid bringing food for patients from outside.	5	50	4	40	1	10
Forbid bringing children(less than12years)in visits.	4	40	5	50	1	10
Total Human resources	Unsatisfactory		Satisfactory			
	No	%	No	%		
	7	70 %	3	30 %		

DISCUSSION

Health care associated infections are a major problem for patients' and healthcare workers' safety and their prevention must be a top priority for healthcare systems and organizations (Alhumaid et al., 2021). Nurses and patients are often exposed to various types of infections during their clinical practice. Knowledge and compliance with standard precautions are essential to prevent hospitals associated infections and protect patients as well as medical workers from exposure to infectious agents (Al-Faouri et al., 2021).

Concomitantly, the factors affecting compliance with standard precautions may be related to environmental factors like materials, equipment availability, or maybe related to manager lack of commitment or individual factors like knowledge and experience(AlJohani et al., 2021).

As regard to demographic characteristics of the studied nurses the current results showed that the majority of them were in age group from twenty to twenty nine years old and about two thirds of them were females and with experience less than five years old.

This finding were in line with the study findings by(Geberemariyam, Donka, & Wordofa, 2018) reported that nurses were more likely to have infection prevention knowledge if they worked longer ten years or more. Also (Al-Faouri et al., 2021) found that no differences were found in compliance scores between both genders, levels of education, and professional ranks .

Regarding total knowledge of studied nurses regarding to infection control measures the present study revealed that the nurses had a majority of Satisfactory level of knowledge of infection control measure. This is due to presence of an infection control team inside hospital, which conducts continuous lectures and updates information related to infection control.

The interpretation is supported by (Al-Faouri etal., 2021)indicated a high satisfactory level of knowledge among nurses. And asserted that the level of compliance might be influenced by the level of knowledge as has been the case in other studies with intermediate to high compliance with the standard precautions.

The study result revealed that the Satisfactory level of knowledge of infection control measure were for the personal protective equipment, the needle stick management, and knowledge of waste management. This is due to the fear of infection transmitted by blood and respiratory tract especially COVID-19.

Literature supported these findings, the study conducted by (AlJohani et al., 2021) who reported that the study asserted that knowledge about needle sticks hazards and good practices are necessary for medical staff because they have to serve in the future. Therefore, it is important for them to learn how to protect themselves from occupational hazards, most importantly, infection.

In the same context(Asmr et al., 2019)revealed that the standard precaution against blood borne pathogens(as waste management, needle stick injury and personal protective equipment) among nurses had good knowledge.

Findings regarding total practice of studied nurses regarding to application of infection control measures in this study, it was observed that nurses had four-fifths of a satisfactory level of practice of infection control measure. This may be related to the head of the unit and infection control team in the hospital follow the application of infection control inside the unit, and accordingly, giving the monthly evaluation.

On the same line, a study conducted by (Sahiledengle, Gebresilassie, Getahun, & Hiko, 2018) who founded that the nurses had good infection prevention practices. These findings counter to (Chitimwango, 2017) shows that the nurses' practices had poor with regard to infection prevention and control.

Regarding to the relationship between Knowledge and practice among studied nurses the current results shows that statistically significant relation between total nurses' knowledge and total nurses practice of studied sample. This may be due to the studied nurses applying their knowledge gained from infection control training. Which may be due

This study supported some of the findings in the study done by(Kim and Hwang, 2020) found that nurses' knowledge did not affect their compliance with infection prevention control practices. Similarly, Russell et al., (2018) who reported that knowledge of infection control was not associated with compliance of the nurses.

Inadequate human resources and factors connected to infection control standards in intensive care units negatively affect how well they are applied to professional and non-professional employees as well as visitors. No one, even working staff, is required to refrain from eating or drinking inside the facility. Staff who are not on duty don't wash their hands before going into and coming out of the ICU. Inadequate screening of visitors for communicable diseases (such as skin rashes, respiratory infections, etc.) before allowing them to enter the unit may also be to blame. also may be due to both the hospital administration and the chiefs of nurses and nurses within the intensive care units are not emphasizing the necessity of doing these points.

CONCLUSIONS

Based on the results of this study, we conclude that:

The current study demonstrated a satisfactory of knowledge, practice, and infection control measures regarding infection control measures in intensive care units, the unsatisfactory human resources, and statistical significant relationship between nurses knowledge and practice.

RECOMMENDATIONS

Based on the results of current research, the following recommendations are proposed:

- Plan for continuous education regarding infection control measures and updating knowledge and practice
- It is necessary to do research on doctors' perceptions of their involvement in infection prevention and control.
- it is necessary to do research on factors affecting the application of infection control measures among cleaner workers in port said hospitals

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معرفة وممارسة الممرضات فيما يتعلق بتدابير مكافحة العدوى في وحدة العناية المركزة

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كلية التمريض – جامعة بورسعيد

الخلاصة

تعد العدوى أمرًا شائعًا بين المرضى في وحدة العناية المركزة. الامتثال لتدابير الوقاية من العدوى هو الطريقة الوحيدة لتقليل وحماية العاملين في مجال الرعاية الصحية والمرضى والمجتمع من حدوث العدوى المرتبطة بالرعاية الصحية والإصابات غير الضرورية.لذلك هدُفت هذه الدراسة إلى العوامل التي تؤثر على تطبيق إجراءات مكافحة العدوى بين الممرضات في وحدات الرعاية المركزة. **طرق وأدوات البحث**: استخدام تصميم البحث الوصفي علي جميع الممرضات الذين عملوا في وحدات العناية المركزة لمدة عام أو أكثر. وتم جمع البيانات الخاصة بالدراسة باستخدام استمارة تقيم شخصي وقائمة ملاحظة الممرضات، هذا بالإضافة إلى استمارة ملاحظة الموارد البشرية التي تؤثر علي تطبيق مكافحة العدوي. **النتائج** :أوضحت الدراسة أن غالبية الممرضات الخاضعات للدراسة (89.1٪) يتمتعن بمستوى مرضٍ من المعرفة ، وأن ما يزيد قليلاً عن أربعة أخماس الممرضات تحت الدراسة (80.5٪) لديهن مستوى مرضٍ من الممارسة ،وايضا لديهم مستوى غير مرضٍ من الموارد البشرية (70٪). **الاستنتاجات**: أشارت الدراسة الحالية إلى مستوى مرضٍ من المعرفة والممارسة وتدابير مكافحة العدوى لتطبيق تدابير مكافحة العدوى في وحدات العناية المركزة ، لكن العوامل التي تؤثر على تطبيق تدابير مكافحة العدوى في وحدات الرعاية الحرجة كانت موارد بشرية غير مرضية.**التوصيات**:يجب تثقيف الممرضات حول تدابير مكافحة العدوى على أساس منتظم وتحديث معارفهم وممارساتهم بشكل منتظم. كذالك من الضروري إجراء بحث حول العوامل التي تؤثر على تطبيق تدابير مكافحة العدوى بين عمال النظافة في مستشفيات بورسعيد

الكلمات المرشدة: *إجراءات مكافحة العدوى ، وحدات العناية المركزة ، المعرفة ، الممارسة.*