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Exploring Iraqi Nurses' Knowledge toward Infection Control in Burning Center

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ABSTRACT

Objective: *The study aimed to assess knowledge level among nurses regarding infection control in burn units and to find out the relationship between nurses' knowledge and their sociodemographic data.* ***Method:*** *A descriptive cross-sectional study was conducted from November 1st, 2023, until April 1st, 2024, involving a non-probability purposeful sample of 70 nurses working at the Burns Center in Najaf and Al-Sadr Teaching Hospital.* ***Result:*** *The findings indicated that the majority of nurses demonstrated a good knowledge level regarding infection control, with nurses' educational level and the availability of protocols showing a statistically significant relationship with their knowledge.* ***Novelty:*** *This study highlights the critical role of nurses' educational background and institutional support in shaping infection control practices in burn units, emphasizing the need for continuing education, larger-scale research across wider regions, and the use of mass media by the Ministry of Health to strengthen infection control knowledge among nursing staff.*

INTRODUCTION

In nursing, the concept of safety is fundamental to the care of clients and the safety of care providers. Meanwhile, patient safety practices have been defined as "those that reduce the risk of adverse events related to exposure to medical care across a range of diagnoses or conditions [1]. Estimates show that in developed countries as many as one in 10 patients is harmed while receiving hospital care of every 100 hospitalized patients at any given time, will acquire health care-associated infections [2]. Hundreds of millions of patients are affected by, worldwide each year, resulting in significant mortality and financial losses for health systems [3].

The history of infection control practices in nursing begins to take place in hospitals in 1840 when the importance and influence of hand-washing was brought to the forefront of the medical area after independent studies by Semmelweis who established a link between the hands of health care workers and the spread of hospital-acquired infection [4]. In 1854 Florence Nightingale was the first to suggest that environmental factors affect health (often called the environment theory). She linked health with five environmental factors: Pure fresh air, Pure water, Efficient drainage, Cleanliness and Light, it was found that by implementing the improved patient care measures such as cleanliness and ventilation, the mortality rate dropped from 42.7% in early 1855 to 2.2% in June 1855 [4].

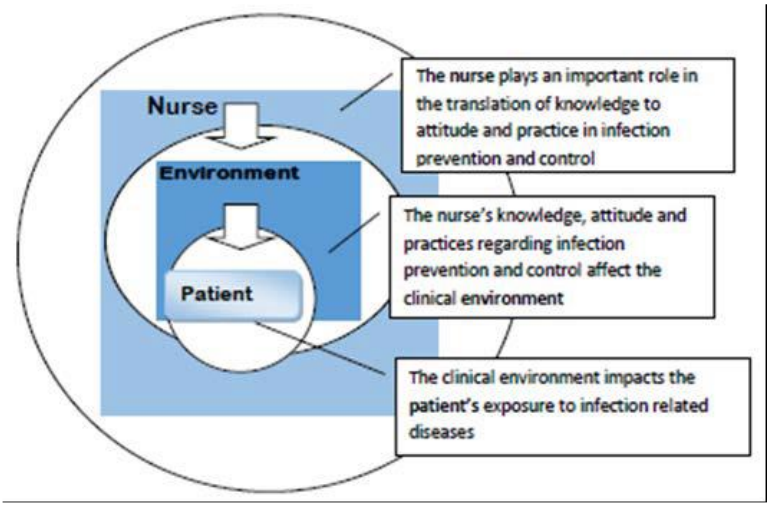

Figure 1. Florence Nightingale's conceptual frame work on environmental theory [5].

The best clinical care in the world can be worthless if patients pick up other infections while they are in the hospital [4]. Infection is the most common cause of death among burn patients following the burn injury itself. Thus, the burn care units can be the site of explosive and prolonged outbreaks caused by resistant organisms [1]. Burn wound infections are one of the most important and potentially serious complications that occur in the acute period following injury [6]. Burns are still the most well-known and disastrous forms of trauma in the world. Its wounds are easily liable for infection [7].

Burn injury is a frequent occurrence; each year more than 400,000 receive medical treatment and 40,000 people are hospitalized for burn injury [8]. Also, estimated 500,000 people are treated for minor burn injury annually [9]. While, Aproximately 180,000 deaths occur by burn every year estimated by world health organization (WHO) in 2018 [10]. Hospital-associated infections also include occupational infections which occur among health care workers due to occupational hazards [3], [4]. Health care associated infections originating from endogenous or exogenous sources are a feared complication of burn injury affecting 7% of patients, with mortality rates of up to 33% [11].

The injury represents an assault on all aspects of the patient, from the physical to the psychological. It affects all ages, from babies to elderly people, and is a problem in both the developed and developing world [9]. Burns could also leading to many disability-adjusted life-years lost in low and middle-income countries [10].

Burn can experience with devastating effects on the skin, the largest organ in the body. Normal skin protects us from invasive infection by microorganisms. Burn injury occurs from tissue loss or tissue damage, as a result of direct contact or exposure to any thermal, chemical, electrical, or radiations which are termed burns. Burns severity depends on its depth and the body surface affected [2]. The organisms associated with infection in burn patients include gram positive, gram-negative, and yeast/fungal organisms. The sources of these organisms include the patient's own endogenous (normal) flora, exogenous sources in the environment, and from healthcare personnel [1].

Infection in the burn patient is a leading cause of morbidity and mortality and persistent to be one of the greatest challenging concerns for the burn team. Burn patients are at a considerable risk for infection because the nature of the burn injury itself, the immune compromising effects of burns, prolonged hospital stays, diagnostic and therapeutic procedures [2], [5]. Burn injury stimulates the ''fight or flight'' mechanism, generating the release of cortisol, epinephrine, and, equally important, cytokines, including interleukin, tumor necrosis factor, interleukin, and granulocyte macrophage colony stimulatory factor [8].

The most common complications associated with burn are burn wound infections while other frequent complications are sepsis, pneumonia, lung failure, acute renal failure, acute respiratory distress syndrome, and multi organ failure. Burn wound infections can spread like other infections and follow the universal chain of infection that includes three components, causative agents of infection; ways of transmission; and patient susceptibility for infection [10], [11].

Physiologically, acute metabolic and immune dysregulation are induced by burn wounds. The loss of the cutaneous protective (the first line of defense against pathogenic microorganisms) layer and the consequent constant exposure to infective microorganisms in the environment further increases burn patients' susceptibility to infection. This directly correlates with the increased rates of infection and mortality observed concomitantly with that of burn wound extent [12], [13].

The visible physical and the invisible psychological scars are long lasting and often lead to chronic disability. Burn injuries represent a diverse and varied challenge to medical and paramedical staff [9].

Importance of Study

In hospitals, infected patients are a source of infection transmission to other patients, health care workers and visitors [5]. The emergence of life-threatening infections, which are invasions and multiplication of microorganisms in body tissues, have highlighted the need for effective infection control program in all health settings [4]. Healthcare-Associated Infection (HAI) has become a major component of the national and international movement to enhance patient safety. Any laxity in the application of infection control measures can result in significant negative consequences [1].

Management and care of patient with burn injury need a unique body of knowledge and skills from a responsible multidisciplinary team members. Burn injuries are potentially life-threatening conditions and burn patients demand exceptional care [2], [10]. Burn patients require special awareness in terms of infection and infection control. Loss of skin integrity, the use of invasive devices and inhalation trauma predisposes burn patients to hospital-acquired infections in a unique manner [14].

The patient's health history affects burn care. This makes each burn patient unique and provides a variety of challenges to the patient's plan of care. In caring for the patient with a burn injury, it is important to remember that many factors influence the care that we are able to deliver [9].

The nurse plays an important role in infection control and prevention [3]. This care should be given by knowledgeable and competent nurses following specific guideline or protocols that will reduce the occurrence of infection and complications. Hence, there is evidence that especially the nurse [10].

Nursing staff are often exposed to various infections during their clinical practice, and as health care workers, nursing staff have a huge responsibility to protect themselves, their families, and their patients from danger because they work in an environment that encourages infections, and health care is always facing new dangers from incurable infections [4].

Nurses have greatest role to prevent the transmission of infections among patients and protecting the health of the staff. Education of staff members regarding earlydetection, risks and symptoms associated with infection, infection control, effective hand hygiene and use of personal protective barriers when changed wound dressing are key elements to consider [2].

Nurses are at the center of patient care and are the healthcare professionals most likely to intercept errors and prevent harm to patients They can directly prevent infections by performing, monitoring, and assuring compliance with aseptic work practices; providing knowledgeable collaborative oversight on environmental decontamination; serve as the primary resource to identify and refer ill visitors or staff; reduce the risk for infection and colonization using evidence-based aseptic work practices. This is of particular importance in burn units [1]. The nurse must also be able to communicate effectively with patients who have burn injuries, family members in crisis, and members of the entire interdisciplinary burn management team. This ensures quality care, improved patient outcomes, and optimal quality of life [9].

During the acute hospitalization, the nurse caring for the burned patient spends more time with the patient than any other member of the burn team. The bedside nurse caring for the severely burned patient is given more responsibility than in most types of serious illness. This is as important when modern burn care began as it is today The nurse may also be the best person to act as patient advocate for psychosocial needs such as pain control, anxiety, and the like [15]. Lack of knowledge among nurses can increase the rate of hospital-acquired infections [5].

Objective of Study

a. To assess knowledge level among nurses regarding infection control in burn units
b. To find out the relationship between nurses' knowledge and their sociodemographic data.

RESEARCH METHOD

Study design: Descriptive cross-sectional study was adopted in order to achieve the stated objectives. The study began from November 1st, 2023 until April 1st, 2024.

Administrative Arrangements: The researcher got a consent from the Nursing Specialties Branch in the faculty of Nursing/University of Kufa. also, an official

agreement is achieved from the Ministry of Health/Najaf department in order to implement the study questionnaire and facilitate entrance to health places.

Ethical Considerations: The researcher promised to keep the sample participant information confidential and use these data for this study only. In addition, the researcher told each participant that this is voluntary work, and they can leave any time They want or even They didn't want to participate.

Study setting: The study was conducted in Burns Center in Najaf and Al-Sadr Teaching Hospital.

Study sample: A Non-Probability (Purposeful Sample) of 70 nurses in Burns Center in Najaf and Al-Sadr Teaching Hospital.

The Study Instrument: An Arabic and English questionnaire is constructed by the researcher to assess nurses knowledge toward infection control.

The complete instrument of study consists of 2 parts:

Part 1: Sociodemographic Data: This part consists of (5) items, which includes age, Experience, educational level (Qualifications) and 2 (2) yes or no question (Close question) for Protocol availability regarding infection control and Information received regarding infection control previously or not

Part 2: infection control knowledge: It consists of 27 items in yes or no question type

Instrument Reliability: The researcher used Internal Consistency Reliability to check consistency of the measurement itself. Researcher used Cronbach's alpha to determine that. By using of Microsoft excel (2019) to fill the data, the outcome was determined by using SPSS Program (V 26) as:

Accepted value	Actual Value	Reliability Technique
0.7	0.701	Internal Consistency

Data Collection: The data collection was done by applying the constructed the Arabic version of the questionnaire. The questionnaire was answered by the participants individually without the intervention of the researcher. The data collection process started from January, 29th, 2024 to February, 17th, 2024. The respondents spend about 5 minutes to answer all items.

Statistical Analysis: The following statistical data analysis approaches used in order to analyze the data of the study under application of the statistical package (SPSS) ver. (26), and the Microsoft excel (2021):

1. Descriptive Data Analysis

a. Tables (Frequencies, and Percentages).
b. Summary Statistics tables including Mean and standard deviation.
c. Cronbach's alpha to determine the reliability of the study instrument.

2. Inferential Data Analysis

This approach used to accept or reject the statistical hypothesis, which included Chi-Square test.

RESULTS AND DISCUSSION

Results

Table 1. Descriptive statistical analysis (frequencies and percentages) of demographic data.

Demographic Data		Freq.	%
Age	20-24 Years	28	40.0
	25-29 Years	19	27.1
	30-34 Years	8	11.4
	35-39 Years	5	7.1
	40-44 Years	3	4.3
	45-49 Years	5	7.1
	50 years and above	2	2.9
Years of experience	1-4 Years	39	55.7
	5-9 Years	14	20.0
	10-14 Years	4	5.7
	15-19 Years	5	7.1
	20-24 Years	7	10.0
	25 Years and above	1	1.4
Educational Level	Nursing preparatory school	5	7.1
	Diploma in general nursing	46	65.7
	Bachelor of science in nursing	19	27.1
Protocol availability regarding infection control	Yes	63	90.0
	No	7	10.0
Information received regarding infection control	Yes	63	90.0
	No	7	10.0
Total		70	100

Table 1 Shows that the majority of the study sample age between 20-24 years (40%), with 1-4 years of experience (55.7%), having Diploma in general nursing (65.7%), many of them (90%) reported that there is Protocol availability regarding infection control and (90%) have previous information regarding infection control.

Tabel 2. Frequency distribution of Nurses' Knowledge Regarding infection control items.

Nurses' Knowledge Regarding infection control			Freq.	%	MS.	SD.	Assess.
Q1	Burn patients are unique due to propensity to disperse microbes in environment	No	23	32.9	1.67	.473	Fair
		Yes	47	67.1			
Q2	Did you know that the about referral criteria of American Burn Association?	No	51	72.9	1.27	.448	Poor
		Yes	19	27.1			

Q3	Did you know that which zone is located in the center of burn wound?	No	12	17.1	1.83	.380	Good
		Yes	58	82.9			
Q4	Did you know that the soak the burn in cool water, then treat it with a skin care product like aloe vera cream or an antibiotic ointment?	No	34	48.6	1.51	.503	Fair
		Yes	36	51.4			
Q5	Did you know that the one of major burn infection is burn wound cellulitis?	No	11	15.7	1.84	.367	Good
		Yes	59	84.3			
Q6	Did you know that the common cause of fever in burn patients is systemic inflammatory response not a pathogenic action of microorganisms?	No	22	31.4	1.69	.468	Good
		Yes	48	68.6			
Q7	Did you know that the burn wound cellulitis is most common infection in burn patients?	No	19	27.1	1.73	.448	Good
		Yes	51	72.9			
Q8	Did you know that the burn wounds initially colonized with gram-positive organisms?	No	22	31.4	1.69	.468	Good
		Yes	48	68.6			
Q9	Did you know that the sepsis syndrome clinically manifested by following, bloodstream infection, Fluid loss, including low blood volume, Dangerously low body temperature?	No	10	14.3	1.86	.352	Good
		Yes	60	85.7			
Q10	Did you know that the exogenous microorganisms are more resistant as compared to endogenous	No	16	22.9	1.77	.423	Good
		Yes	54	77.1			
Q11	Did you know that the principle causative agent of	No	20	28.6	1.71	.455	Good
		Yes	50	71.4			

	burn cellulitis gram positive organisms?						
Q12	Did you know that the routine surveillance cultures should be taken after 3 months?	No	26	37.1	1.63	.487	Fair
		Yes	44	62.9			
Q13	Did you know that the Semi Quantitative swab culture provide information about the presence of microorganisms on the external catheter surface?	No	13	18.6	1.81	.392	Good
		Yes	57	81.4			
Q14	Did you know that the contact precautions are most effective than other precautions?	No	17	24.3	1.76	.432	Good
		Yes	53	75.7			
Q15	Did you know that the plants and flowers harbor resistant organisms that's why these are not allowed in burn unit?	No	25	35.7	1.64	.483	Fair
		Yes	45	64.3			
Q16	Did you know that the "According to Spaulding classification of medical devices, which come in contact with mucous membranes or nonintact skin require high level of disinfection as semi critical item?	No	13	18.6	1.81	.392	Good
		Yes	57	81.4			
Q17	Did you know that the CDC guidelines of disinfection, Immersion time of equipment for high level disinfection (HLD) with 2.4% glutaraldehyde?	No	38	54.3	1.46	.502	Fair
		Yes	32	45.7			
Q18	Did you know that the high touch surface areas must be clean and disinfect?	No	7	10.0	1.90	.302	Good
		Yes	63	90.0			
Q19		No	24	34.3	1.66	.478	Fair

	Did you know that the chlorhexidine bath and its suggested frequency in burn patients for prevention of infection in burn patients?	Yes	46	65.7			
		No	15	21.4			
Q20	Did you know that the factor including high antibiotic pressures, high colonization pressures, need for intensive medical and surgical therapy, and a vulnerable, immunocompromised patient leads to acquisition of antibiotic resistant organism in burn patient's?	Yes	55	78.6	1.79	.413	Good
		No	7	10.0			
Q21	Did you know that the preparation of the isolation room or area, ensure that appropriate handwashing facilities and hand-hygiene supplies are available?	Yes	63	90.0	1.90	.302	Good
		No	13	18.6			
Q22	Did you know that the precautions such as hand washing and barrier nursing, efficient cleaning and decontamination of hospital equipment, are most important for prevention of MRSA in burn patients?	Yes	57	81.4	1.81	.392	Good
		No	9	12.9			
Q23	Did you know that the burn Patients require additional infection control precautions?	Yes	61	87.1	1.87	.337	Good
	Did you know that the nasal decolonization of MRSA patients done by mupirocin?	No	37	52.9			
Q24		Yes	33	47.1	1.47	.503	Fair

Q25	Did you know Aquatic environment of hydrotherapy room is difficult to decontaminate?	No	30	42.9	1.57	.498	Fair
		Yes	40	57.1			
Q26	Did you know that the specific antiseptic such as Chlorhexidine gluconate recommended for hand washing?	No	27	38.6	1.61	.490	Fair
		Yes	43	61.4			
Q27	Did you that the Important step during removal of personal protective equipment?	No	13	18.6	1.81	.392	Good
		Yes	57	81.4			

Poor : MS = <1.33 ; Fair: MS =1.34 - 1.67 ; Good : MS≥1.68+

Table 2 Shows good level of knowledge for study item number 3,6-11,13,14,16,18,20-23,27, Moderate knowledge level in item 1,4,12,15,17,19,24-26 and only poor knowledge in item 2.

Table 3. Frequency distribution of overall Items of infection control Knowledge.

Overall Items		Freq.	%	Mean of score	Assess.
Knowledge	Poor	1	1.4		
Regarding infection	Fair	23	32.9	1.70	Good
control	Good	46	65.7		

Poor : MS = <1.33 ; Fair: MS =1.34 - 1.67 ; Good : MS≥1.68+

Table 3 Shows that Nurses knowledge Regarding infection control is Good (65.7%).

Table 4. Relationship between demographic data and nurses knowledge Regarding infection control.

Demographic Data		Knowledge Regarding infection control			Chi.	d.f.	p-value
		Poor Freq.	Fair Freq.	Good Freq.			
Age	20-24 Years	0	14	14	13.375	12	.342 (NS)
	25-29 Years	1	6	12			
	30-34 Years	0	0	8			
	35-39 Years	0	2	3			

Years of experience	40-44 Years	0	0	3	8.710	10	.560 (NS)
	45-49 Years	0	1	4			
	50 years and above	0	0	2			
	1-4 Years	0	17	22			
	5-9 Years	1	3	10			
	10-14 Years	0	1	3			
	15-19 Years	0	1	4			
	20-24 Years	0	1	6			
	25 Years and above	0	0	1			
Educational Level	Nursing preparatory school	1	2	2	13.632	4	.009 (S)
	Diploma in general nursing	0	15	31			
	Bachelor of science in nursing	0	6	13			
Protocol availability regarding infection control	Yes	0	21	42	9.130	2	.010 (S)
	No	1	2	4			
Information received regarding infection control	Yes	1	22	40	1.401	2	.496 (NS)
	No	0	1	6			

P-Value <=0.05 (significant) ; p-value > 0.05 (non-significant)

Table 4 Shows that there is statistically significant relationship between nurses knowledge and their Educational Level (P value <=0.009) and the Protocol availability regarding infection control (P value <=0.01), while there is non- significant relationship between the other variables.

Discussion

A methodically structured understanding and reasonably derived discussion of study results will be presented with nurses' knowledge toward infection control in burn units and the relationship between them and their sociodemographic data.

Discussion of the study sample socio-demographic data

Most of the study sample age is between 20-24 years old (40%), we believe that these ages were the ages most interested in the topic of our research, so the majority of participants were among them. This result was close to [2] study that found most of the nurses participants in the study are less than 25 years (51.42%).

In the matter of years of experience in current study its between 1 - 4 years (55.7%). That is also because of the majority of the age group, As there is not much time between their graduation from college and their work in the hospital. In [9] study they found most of the study sample years of experience is equal or less than one year (45%).

Also, most of the participants educational level had completed diploma degree in general nursing (65.7%), this is due to the fact that most of their ages were between 20-24, and usually most of those at these ages had completed their degrees. [1] study found (85.3%) of the sample have diploma degree in nursing.

Many of the nurses (90%) reported that protocol availability regarding infection control is present. It is a positive sing that indicates the availability of all requirements for infection control. Meanwhile in [10] study than conducted in Pakistan they mentioned (77.1%) on the nurses reported that there is no protocol availability regarding infection control.

In the current study we found that (90%) of the nurses reported that they received previously information regarding infection control. This is due to continuing education courses in the hospital and their study, as well as the media. This result comes along with [4] study that found similar result with (84.37%) of the nurses had received information regarding infection control.

Discussion of the nurses knowledge toward infection control in burn units

The overall results regarding nurses' knowledge about infection control was good (65.7%). while (32.9%) them got fair knowledge level and only (1.4%) got poor level of knowledge. This is due to several reasons and significant relationships that led to this result and we will discuss it further in this chapter.

According to many studies such as [5] study that conducted on 195 nurses to assess their knowledge, attitude and practice (KAP). The researcher concluded most of the nurses have good knowledge and the researcher motioned that despite performing well in knowledge and showing a positive attitude towards infection prevention and control, nurses had unsatisfactory practice levels regarding infection prevention and control, exposing the patients to infection-related diseases.

Discussion of the relationship between Nurses knowledge toward infection control in burn units and their socio demographic data

In the previously mentioned results, nurses educational level appeared to be a statistically significant factor (P value=0.009) that has a direct effect on nurses' level of

knowledge. This makes sense, as the more certification and study the nurse goes for, the more information a nurse has about infection control. This result proved by [3] findings.

Also, in the current results wo found that the protocol availability regarding infection control (P=0.01) is statistically related to nurses' knowledge. The researcher believes that because the necessary equipment is available, the nurse knows their correct use, and therefore he has acquired information to control the infection. But in [10] study they did not mention any relationship between protocol availability and nurses knowledge regarding infection control.

CONCLUSION

Fundamental Finding : According to the study findings and discussion, the study concluded that many of the study sample have 1–4 years of experience in nursing, completed diploma in general nursing, also a lot of them reported that there is protocol availability regarding infection control and many of them have previous information regarding infection control. The majority of the nurses participating in the current study have good knowledge level regarding infection control. **Implication :** Nurses educational level and the protocol availability is statistically significant related to their knowledge regarding infection control, which emphasizes the importance of structured education and clear protocols in enhancing infection control practices. **Limitation :** The study is limited in its scope to the sample investigated, focusing on specific demographics and conditions that may not reflect all nursing environments. **Future Research :** Further studies are encouraged to broaden the scope and include larger and more diverse populations to strengthen the generalizability of findings and deepen the understanding of factors affecting nurses' knowledge on infection control.

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