

Article

# Knowledge and Awareness of Respiratory Care Unit (RCU) Healthcare Providers Regarding Transmissible Pathogens in the RCU

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**Abstract:** Introduction: The healthcare providers in respiratory care units are at increased risk of exposure to transmissible pathogens due to close contact with patients and involvement in aerosol-generating procedures. Adequate knowledge and awareness of transmissible pathogens are essential to reduce the risk of healthcare-associated infections and ensure the safety of patients and healthcare providers. The study aimed to assess the knowledge and awareness of healthcare providers in respiratory care units regarding transmissible pathogens. Method: A descriptive (cross-sectional) study was conducted among (42) respiratory care unit healthcare providers at Azadi Teaching Hospital in Kirkuk city/Iraq. A non-probability (convenience) sampling method was used to recruit healthcare providers from the respiratory care unit. The participants who met the eligibility criteria and agreed to participate were included in the study. A structured self-administered questionnaire was used to collect data that included demographic characteristics and knowledge and awareness of transmissible pathogens. The data were analysed using SPSS version 26. Results: The study showed that most participants were aged 23-27 years. The overall mean score of the respiratory care unit healthcare providers' knowledge was 7.17 out of 10, representing 71.7%, and the overall mean awareness score was 36.71 out of 50, representing 73.4%. Overall, the result showed that participants generally had a good level of knowledge and awareness regarding transmissible pathogens. Conclusion: The respiratory care units' healthcare providers demonstrated good knowledge and awareness of transmissible pathogens. Continuing regular education training programs on transmissible pathogens and preventing infection are recommended to reduce occupational exposure and prevent transmissible pathogens in the respiratory care units.

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**Keywords:** Respiratory care unit, Healthcare providers, Transmissible pathogens, Knowledge, Awareness.

## 1. Introduction

Healthcare-associated infections are considered a severe threat to patient safety and global public health, especially in intensive care units and respiratory care units, because respiratory care units provide specialised care for patients with acute and chronic respiratory problems. Patients admitted to these places often require mechanical ventilation, invasive procedures (airway suctioning, endotracheal intubation and bronchoscopy), and close contact between healthcare providers and critically ill patients that heighten risks of nosocomial infection [1]. Transmissible pathogens found in respiratory care units (RCUs) can include different types of microorganisms, such as bacteria, viruses, and fungi. Common examples are Mycobacterium tuberculosis, influenza viruses, respiratory syncytial virus (RSV), SARS-CoV-2, methicillin-resistant Staphylococcus aureus (MRSA), multidrug-resistant Gram-negative bacteria, and other microorganisms that can contribute to healthcare-associated infections [2]. Preventing the

transmission of respiratory care unit pathogens requires healthcare providers to understand how these organisms spread and consistently apply infection-prevention and control practices [3]. Those practices include effective hand hygiene, correct selection and use of personal protective equipment (PPE), appropriate patient placement, disinfection of medical equipment, respiratory etiquette, safe injection and waste-disposal techniques, and ensuring adequate ventilation. For patients with suspected or confirmed respiratory infections, additional transmission-based precautions may be necessary [4]. The Centres for Disease Control and Prevention recommends early recognition of respiratory infections and appropriate use of transmission-based precautions, including suitable patient placement and personal protective equipment [5]. Similarly, the World Health Organisation (WHO) highlights the importance of clinical triage, respiratory hygiene, environmental controls, sufficient ventilation, and appropriate PPE, particularly during aerosol-generating procedures [6]. Knowledge and awareness among respiratory care unit (RCU) workers are important for effective infection prevention and control. Knowledge includes understanding infectious pathogens, how they are transmitted, possible risk factors, common signs and symptoms, and appropriate preventive measures [7]. Awareness, on the other hand, involves recognising the risks associated with transmissible pathogens and understanding the importance of following infection prevention and control (IPC) policies during daily patient care [8]. However, having good knowledge does not always mean that healthcare workers consistently follow recommended practices. Factors such as heavy workload, staff shortages, inadequate supplies, limited training opportunities, overcrowding, and lack of supervision may affect their adherence to infection-prevention measures [9]. Assessing knowledge and awareness of RCU workers can help identify areas where further education and improvement are needed. The results may also inform targeted training programs, strengthen hospital IPC policies, improve compliance with standard and transmission-based precautions, and reduce occupational exposure and healthcare-associated infections. Previous studies have highlighted the importance of assessing healthcare workers' knowledge and awareness of IPC measures to support the effective implementation of infection-prevention programs [10]. Therefore, this study aims to assess the knowledge and awareness of respiratory care unit workers regarding transmissible pathogens and their prevention and control within the RCU. The findings may help identify educational needs, support the development of appropriate training interventions, and contribute to safer healthcare practices for both patients and healthcare providers.

## 2. Materials and Methods

A descriptive cross-sectional design was used to assess knowledge and awareness of respiratory care unit healthcare providers regarding transmissible pathogens from February 2026 to September 2026. The study was conducted in the respiratory care unit at Azadi Teaching Hospital in Kirkuk city, Iraq, among healthcare providers. Ethical approval was obtained from the Ministry of Health, Kirkuk Health Directorate, and Azadi Teaching Hospital, and each Nurse provided written informed consent to the researcher. According to the subject's agreement sheet, the researcher informed the participants of the study's objectives, that participation was not obligatory, and that the data would be kept private and archived. Non-probability (convenience) sampling was used among 42 healthcare providers (physicians, nurses, anaesthetists) who worked in the respiratory care unit. The Participants were included in the study if they were healthcare professionals working in the selected study setting, were available during the data collection period, agreed to participate voluntarily, and were able to understand and complete the study questionnaire. The Participants were excluded from the study if they did not agree to participate, were absent during the data collection period, or submitted an incomplete questionnaire. The data were collected using a structured self-administered questionnaire. The questionnaire consisted of three sections: demographic characteristics, knowledge regarding transmissible pathogens, that include 10 questions and an awareness section regarding transmissible pathogens, which included 10 items using a

five-point Likert scale. The content validity of the study tools (structured self-administered questionnaire) was assessed by a panel of several experts in the relevant field to ensure content validity, clarity, and relevance to the study objectives. The reliability of the questionnaire was determined through the use of the Cronbach's alpha test approach. The alpha reliability of this study was = 0.87. The data were analysed by using descriptive statistical and inferential procedures (SPSS 26.0) through the application of descriptive statistical analysis, which includes frequency (Freq) and percentage (%), mean score (MS), and Standard Deviation (SD). The total mean scores of participant knowledge and awareness were calculated and expressed as percentages. Inferential statistical analyses, such as the Kruskal-Wallis H test, were used to assess differences in knowledge and awareness scores according to some participant demographic and professional characteristics. Kolmogorov-Smirnova test was used to test normal distribution.

### 3. Results

**Table 1.** Distribution of The Samples' Demographic and Professional Characteristics (N=42)

| Variables                                                                |                          | Frequency | %    |
|--------------------------------------------------------------------------|--------------------------|-----------|------|
| <b>Age</b> (Mean $\pm$ SD =26.95 $\pm$ 2.62)                             | 23-27                    | 30        | 71.4 |
|                                                                          | 28-32                    | 10        | 23.8 |
|                                                                          | 33-37                    | 2         | 4.98 |
| <b>Gender</b>                                                            | Male                     | 13        | 31   |
|                                                                          | Female                   | 29        | 69   |
| <b>Years of experience</b><br>(Mean $\pm$ SD =2.93 $\pm$ 2.92)           | 1 – 3                    | 33        | 78.6 |
|                                                                          | 4 – 6                    | 6         | 14.3 |
|                                                                          | 7 – 10                   | 3         | 7.1  |
| <b>Profession</b>                                                        | Physician                | 3         | 7.2  |
|                                                                          | Nurse                    | 30        | 71.4 |
|                                                                          | Anaesthetist             | 9         | 21.4 |
|                                                                          | Diploma                  | 6         | 14.3 |
| <b>Educational level</b>                                                 | Bachelor's               | 35        | 83.3 |
|                                                                          | Postgraduate<br>(Master) | 1         | 2.4  |
| <b>Previous infection control training courses in the last 12 months</b> | Yes                      | 16        | 38.1 |
|                                                                          | No                       | 26        | 61.9 |

**Table 1:** The table shows that out of the total sample, (71.4%) were aged between (23 and 27) years old and (69.0%) were female. In comparison, (78.6%) of the participants had 1-3 years of experience as healthcare providers, while only 7,1% had (7-10) years of experience. The results illustrate that most participants were nurses (71.4). Regarding education level, 83. % of participants reported having a Bachelor's degree, followed by diploma (14.3%). Only 38.1% of participants had taken Previous infection control training courses in the last 12 months.

**Table 2.** Knowledge of RCU Healthcare Providers Regarding Transmissible Pathogens

| Knowledge items                                  | Response  | No. | %    | MS   | MS% | A  |
|--------------------------------------------------|-----------|-----|------|------|-----|----|
|                                                  |           |     |      |      |     | ss |
| What is the most common route of transmission of | Incorrect | 7   | 16.7 | 0.83 | 83  | G  |
|                                                  | Correct   | 35  | 83.3 |      |     |    |

| Knowledge items                                                                                      | Response  | No. | %    | MS   | MS% | Ass |
|------------------------------------------------------------------------------------------------------|-----------|-----|------|------|-----|-----|
| respiratory pathogens in healthcare settings?                                                        |           |     |      |      |     |     |
| Which of the following pathogens is primarily transmitted through the airborne route/                | Incorrect | 14  | 33.3 | 0.67 | 67  | G   |
|                                                                                                      | Correct   | 28  | 66.7 |      |     |     |
| What are the most effective methods for preventing the transmission of infectious agents in the RCU? | Incorrect | 20  | 47.6 | 0.52 | 52  | M   |
|                                                                                                      | Correct   | 22  | 52.4 |      |     |     |
| Which personal protective equipment is recommended when caring for patients with airborne infections | Incorrect | 8   | 19.0 | 0.81 | 81  | G   |
|                                                                                                      | Correct   | 34  | 81.0 |      |     |     |
| When should healthcare workers perform hand hygiene?                                                 | Incorrect | 13  | 31.0 | 0.69 | 69  | G   |
|                                                                                                      | Correct   | 29  | 69.0 |      |     |     |
| Which of the following diseases requires airborne precautions?                                       | Incorrect | 9   | 21.4 | 0.79 | 79  | G   |
|                                                                                                      | Correct   | 33  | 78.6 |      |     |     |
| What should be done after accidental exposure to infectious respiratory secretions?                  | Incorrect | 11  | 26.2 | 0.74 | 74  | G   |
|                                                                                                      | Correct   | 33  | 73.8 |      |     |     |
| What is the purpose of isolation precautions in a healthcare setting?                                | Incorrect | 12  | 28.6 | 0.71 | 71  | G   |
|                                                                                                      | Correct   | 30  | 71.4 |      |     |     |
| How often should reusable respiratory equipment be disinfected?                                      | Incorrect | 11  | 26.2 | 0.74 | 74  | G   |
|                                                                                                      | Correct   | 31  | 73.8 |      |     |     |
| Why is vaccination important for healthcare providers in the RCU?                                    | Incorrect | 14  | 33.3 | 0.67 | 67  | G   |
|                                                                                                      | Correct   | 28  | 66.7 |      |     |     |

Ass = Assessment Intervals (Scoring Scales Based on MS) = [P: Poor (0.00–33.33)]; [M: Moderate (33.34–66.66)]; [G: Good (66.67–100)].

**Table 2:** The table shows participants' responses to knowledge questions regarding transmissible pathogens in the respiratory care units overall; the results indicate that participants had a good level of knowledge.

**Table 3.** Awareness of RCU Healthcare Providers Regarding Transmissible Pathogens

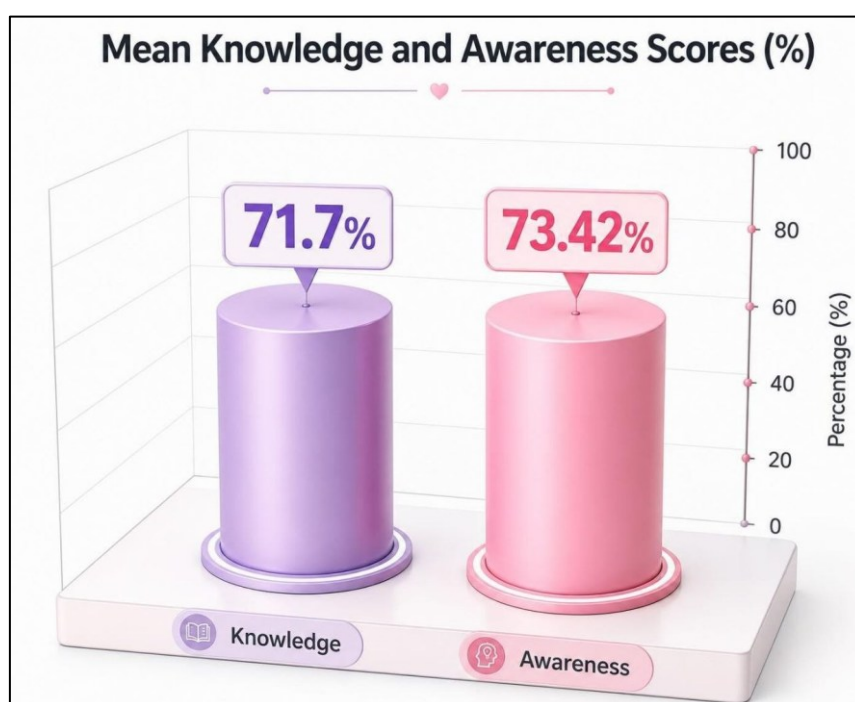
| Awareness items                                                                    | Response          | No. | %    | MS   | MS%   | Ass |
|------------------------------------------------------------------------------------|-------------------|-----|------|------|-------|-----|
| I am aware that respiratory pathogens can spread through droplets generated during | Strongly disagree | 2   | 4.8  | 4.24 | 82.0% | G   |
|                                                                                    | Disagree          | 4   | 9.5  |      |       |     |
|                                                                                    | Neutral           | 4   | 9.5  |      |       |     |
|                                                                                    | Agree             | 4   | 9.5  |      |       |     |
|                                                                                    | Strongly agree    | 28  | 66.7 |      |       |     |

| Awareness items                                                                                                          | Response          | No. | %    | MS   | MS%   | Ass. |
|--------------------------------------------------------------------------------------------------------------------------|-------------------|-----|------|------|-------|------|
| coughing and sneezing.                                                                                                   |                   |     |      |      |       |      |
| I am aware that respiratory pathogens can remain suspended in the air and require airborne precautions.                  | Strongly disagree | 4   | 9.5  | 3.62 | 72.4% | G    |
|                                                                                                                          | Disagree          | 5   | 11.9 |      |       |      |
|                                                                                                                          | Neutral           | 11  | 26.9 |      |       |      |
|                                                                                                                          | Agree             | 5   | 11.9 |      |       |      |
|                                                                                                                          | Strongly agree    | 17  | 40.5 |      |       |      |
| I am aware of the infection control policies used in my respiratory care unit.                                           | Strongly disagree | 3   | 7.1  | 3.60 | 72.0  | G    |
|                                                                                                                          | Disagree          | 6   | 14.3 |      |       |      |
|                                                                                                                          | Neutral           | 8   | 19.0 |      |       |      |
|                                                                                                                          | Agree             | 13  | 31.0 |      |       |      |
|                                                                                                                          | Strongly agree    | 12  | 28.6 |      |       |      |
| I am aware of the correct procedures for hand hygiene before and after patient contact.                                  | Strongly disagree | 3   | 7.1  | 3.95 | 79.0  | G    |
|                                                                                                                          | Disagree          | 3   | 7.1  |      |       |      |
|                                                                                                                          | Neutral           | 5   | 11.9 |      |       |      |
|                                                                                                                          | Agree             | 13  | 31.8 |      |       |      |
|                                                                                                                          | Strongly agree    | 18  | 42.9 |      |       |      |
| I am aware of the appropriate personal protective equipment (PPE) required for different modes of pathogen transmission. | Strongly disagree | 5   | 11.9 | 3.48 | 69.6  | G    |
|                                                                                                                          | Disagree          | 5   | 11.9 |      |       |      |
|                                                                                                                          | Neutral           | 11  | 26.2 |      |       |      |
|                                                                                                                          | Agree             | 7   | 16.7 |      |       |      |
|                                                                                                                          | Strongly agree    | 14  | 33.3 |      |       |      |
| I am aware of the risks associated with aerosol-generating procedures in the RCU.                                        | Strongly disagree | 0   | 00   | 3.50 | 70.0  | G    |
|                                                                                                                          | Disagree          | 10  | 23.8 |      |       |      |
|                                                                                                                          | Neutral           | 12  | 28.6 |      |       |      |
|                                                                                                                          | Agree             | 9   | 21.4 |      |       |      |
|                                                                                                                          | Strongly agree    | 11  | 26.2 |      |       |      |
| I am aware of the importance of disinfecting respiratory equipment after each patient use.                               | Strongly disagree | 3   | 7.1  | 3.83 | 76.6  | G    |
|                                                                                                                          | Disagree          | 3   | 7.1  |      |       |      |
|                                                                                                                          | Neutral           | 7   | 16.7 |      |       |      |
|                                                                                                                          | Agree             | 14  | 33.3 |      |       |      |
|                                                                                                                          | Strongly agree    | 15  | 35.7 |      |       |      |
| I am aware that healthcare providers can transmit pathogens to patients even when symptoms are mild.                     | Strongly disagree | 2   | 4.8  | 3.57 | 71.4  | G    |
|                                                                                                                          | Disagree          | 10  | 23.8 |      |       |      |
|                                                                                                                          | Neutral           | 7   | 16.7 |      |       |      |
|                                                                                                                          | Agree             | 8   | 19.0 |      |       |      |
|                                                                                                                          | Strongly agree    | 15  | 35.7 |      |       |      |
| I am aware of the importance of vaccination in reducing the                                                              | Strongly disagree | 6   | 14.3 | 3.31 | 66.2  | M    |
|                                                                                                                          | Disagree          | 8   | 19.0 |      |       |      |
|                                                                                                                          | Neutral           | 8   | 19.0 |      |       |      |
|                                                                                                                          | Agree             | 7   | 16.7 |      |       |      |

| Awareness items                                                                                                  | Response          | No. | %    | MS   | MS%  | Ass |
|------------------------------------------------------------------------------------------------------------------|-------------------|-----|------|------|------|-----|
| transmission of respiratory infections                                                                           | Strongly agree    | 13  | 31.0 |      |      |     |
| I am aware of the steps that should be taken following accidental exposure to infectious respiratory secretions. | Strongly disagree | 5   | 11.9 | 3.62 | 72.4 | G   |
|                                                                                                                  | Disagree          | 2   | 4.8  |      |      |     |
|                                                                                                                  | Neutral           | 10  | 23.8 |      |      |     |
|                                                                                                                  | Agree             | 12  | 28.6 |      |      |     |
|                                                                                                                  | Strongly agree    | 13  | 31.0 |      |      |     |

Ass = Assessment Intervals (Scoring Scales Based on MS) = [P: Poor (0.00 – 33.33)]; [M: Moderate (33.34– 66.66)]; [G: Good (66.67 – 100)].

**Table 3:** shows responses of the participants to awareness questions. Overall, the findings indicate the participants had a good level of awareness regarding transmissible pathogens in the respiratory care units.



**Figure 1.** Comparison of Mean Knowledge and Awareness Scores among Study Participants

The figure illustrates the mean scores of knowledges and awareness among the study participants. The mean knowledge score was 71.7%, while the mean awareness score was 73.4%. The awareness score was slightly higher than the knowledge score, indicating a relatively good level of both knowledge and awareness among the participants.

**Table 4.** Association between participants' demographic and professional characteristics with knowledge and awareness scores

| Variable | Subgroup | Knowledge |       |                  |            | Awareness |                  |            |
|----------|----------|-----------|-------|------------------|------------|-----------|------------------|------------|
|          |          | N         | Mean  | Kruskal-Wallis H | P-Value    | Mean      | Kruskal-Wallis H | P-Value    |
| Age      | 23-27    | 30        | 21.78 | 0.201            | 0.910 (NS) | 19.98     | 1.785            | 0.410 (NS) |
|          | 28-32    | 10        | 20.20 |                  |            | 25.95     |                  |            |

| Variable            | Subgroup     | Knowledge |       |                  |                | Awareness |                  |               |
|---------------------|--------------|-----------|-------|------------------|----------------|-----------|------------------|---------------|
|                     |              | N         | Mean  | Kruskal-Wallis H | P-Value        | Mean      | Kruskal-Wallis H | P-Value       |
| Years of experience | 33-37        | 2         | 23.75 | 0.474            | 0.789<br>(NS)  | 22.00     | 3.225            | 0.216<br>(NS) |
|                     | 1-3          | 33        | 21.98 |                  |                | 20.08     |                  |               |
|                     | 4-6          | 6         | 21.08 |                  |                | 29.58     |                  |               |
|                     | 7-10         | 3         | 17.00 |                  |                | 21.00     |                  |               |
| Profession          | Physician    | 3         | 34.67 | 3.944            | 0.1394<br>(NS) | 24.83     | 0.272            | 0.873<br>(NS) |
|                     | Nurse        | 30        | 20.87 |                  |                | 21.05     |                  |               |
|                     | Anesthetist  | 9         | 19.22 |                  |                | 21.89     |                  |               |
| Education           | Diploma      | 6         | 15.50 | 3.625            | 0.163<br>(NS)  | 19.17     | 2.505            | 0.286<br>(NS) |
|                     | Bachelors    | 35        | 22.03 |                  |                | 21.37     |                  |               |
|                     | Postgraduate | 1         | 39.00 |                  |                | 40.00     |                  |               |

**Table 4:** The table shows that there were no statistically significant differences between demographic and professional characteristics (age, years of experience, profession, education) and total knowledge and awareness scores, since all p-values were greater than 0.05

#### 4. Discussion

The finding of the study reveals that the majority of the sample, 71.4%, were aged between (23–27) years. This finding corroborated the study conducted at the same hospital, which revealed that the majority of the nurses evaluated were aged between (25–29) years [11]. This high proportion may be because most study participants were recent graduates who began their careers in respiratory care units at a young age. In addition, some more experienced healthcare providers may have been transferred to other departments or assigned to different healthcare facilities to complete their health gradation requirements.

Concerning gender, the findings demonstrated that more than two-thirds of the samples, 69%, were female, whereas 31% were male; this may be due to a larger ratio of female graduates from nursing institutions compared to male graduates in Iraq. The findings were supported by studies that found that over half of the participants were female [12], [13]. This finding may reflect the predominance of female healthcare providers in the RCU setting.

Related to the years of professional experience of the samples, the finding reveals that most of the participants (78.6%) had 1-3 years of experience, indicating that the study population was mainly composed of relatively young and less experienced. This finding agrees with a study performed at Paediatric Teaching Hospital in Baghdad city in Iraq, which found that 47.8 % of participants had 1-3 years of experience in RCU [14].

According to the findings, the nurses constituted the largest professional group (71.4%), followed by anaesthetists (21.4%) and physicians (7.2). This higher proportion of nurses may be attributed to their large representation among healthcare providers and their continuous direct contact with patients, which reflects the important role of nurses in providing continuous care in RCU. The findings were supported by studies that found that over half (58%) of the participants were nurses [7].

Regarding the educational levels, most participants held a bachelor's degree (83.3%), demonstrating a generally good educational background. This finding may also be related to the predominance of nurses in the study sample, as the bachelor's degree is a common educational qualification among nursing staff in RCU. This finding aligns with a cross-

sectional study conducted in RCU in Kirkuk Teaching hospitals, which found that most participants held a bachelor's degree [15].

Concerning previous infection control training courses, 61.9.3%, of the participants hadn't attended any training courses regarding infection control during the previous 12 months. This finding was compatible with research that was conducted at AL-Diwaniyah teaching hospital, which revealed that 82.6% of participants had not received any training course [2]. This finding highlights the need for continuous and regular infection prevention and control training programs to improve healthcare workers' knowledge and awareness of transmissible pathogens in the RCU

This study assessed the knowledge and awareness of RCU workers regarding transmissible pathogens. Overall, the results showed that the participants had a good level of both knowledge and awareness. The mean knowledge score was  $7.17 \pm 2.36$  out of 10 (71.7%), while the mean awareness score was  $36.71 \pm 5.48$  out of 50 (73.4%). These findings suggest that most participants had a good understanding of transmissible pathogens and were generally aware of the importance of infection prevention and control in the RCU. The findings disagree with a study conducted in 13 countries in South Asia and the Middle East that demonstrated differences in knowledge and awareness in healthcare providers [8]; however, the study agrees with another study in Iraq that demonstrated a good level of knowledge and awareness among healthcare providers [2]. The relatively good knowledge level may be related to the nature of the participants' work. RCU workers are frequently involved in the care of patients with respiratory conditions and may therefore be more familiar with infection prevention practices. However, the differences in correct responses across the knowledge questions show that some areas may still need improvement. Similarly, the participants showed a good level of awareness. This suggests that they generally understand the importance of following appropriate measures to prevent the transmission of infections. Nevertheless, some awareness items received lower scores, indicating the need for continuous education and training to address any remaining gaps.

The results showed that participants had similar levels of knowledge and awareness, regardless of their age, work experience, profession, or educational level. The study was compatible with studies [2], [16], [17]. This may be because they worked in the same RCU and were exposed to similar working conditions and infection prevention practices. The small sample size may also have limited the ability to identify significant differences between the groups. Future studies with larger samples are recommended to provide a clearer understanding of the factors that may influence healthcare workers' knowledge and awareness.

## 5. Conclusion

This study concluded that RCU healthcare workers had generally good levels of knowledge and awareness regarding transmissible pathogens. The findings showed that knowledge and awareness were not significantly influenced by age, years of working experience, profession, or educational level. Based on the findings of this study, the researcher recommended conducting regular educational programs and training sessions to help RCU workers maintain and improve their knowledge and awareness of transmissible pathogens. More attention should be given to areas where lower levels of knowledge or awareness were identified. Regular updates and refresher training on infection prevention and control practices may also help healthcare workers stay informed about current guidelines. In addition, regular assessment of healthcare workers' knowledge and awareness is recommended to identify any gaps and provide appropriate support. Future studies involving larger sample sizes are also recommended to provide a better understanding of the factors associated with knowledge and awareness among RCU workers.

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