- *Basic Research*

Applying a Protocol for Airborne Infection Prevention among Internship Students

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Abstract

Background: An airborne disorder is any disease that is caused by a microorganism that is transmitted through the air. Education play an important role in improving knowledge, skills, and attitudes related airborne infection prevention **Study aims:** Applying a protocol for airborne infection prevention among internship students. **Setting:** The study was conducted at Faculty of Nursing, Mansoura University, Egypt. **Subjects:** a purposive sample of (131) internship students, were included in the present study. **Tool:** A questionnaire sheet developed by researchers based on reviewing related literature consists of four parts was used for data collection named demographic, knowledge, practice, and students' attitude toward airborne infection. **Results and Conclusion:** A significant difference was found in level of knowledge, practice and attitude post applying airborne infection protocol. Analysis and comparison of data mean a statistically significant difference regarding to Positive attitude was increased from 50.4% before to 82.4% after applying the protocol. **Recommendations:** The study reflects that, there is a dearth of knowledge among the studied group. Incorporating the concerned issues in the academic curriculum to provide the students with adequate knowledge and information during their formative years is needed

Key words: Airborne infection, Prevention, internship students

1. Introduction

Airborne infections refer to illnesses transmitted through the air by pathogenic microorganisms. including bacteria, viruses, and fungi (Bhardwaj et al., 2021). Droplet infection that caused by a variety of pathogens is considered the primary and important means of disease transmission in civilized countries and developed nations. These microorganisms can be transmitted through close personal contact, coughing, sneezing, laughing, liquid sprays, dust dispersal, talking, or any activity that produces aerosolized particles (Nelson & Williams 2014).

These pathogens travel on dust particles or tiny respiratory droplets and can remain airborne, sometimes carried by air currents over distances. For a long time, diseases transmitted through droplet infection have been among the deadliest in the medical field. It's estimated that respiratory viruses are responsible for nearly half of all human disease cases. Most of these are relatively common infections, such as the common cold, which is the most widespread of all. The occurrence of airborne diseases is approximately double that of water- and food-borne illnesses (Gammon & Hunt 2018). The risk of airborne infections is substantial not only for patients but also for healthcare workers, including nursing students (Abdelaziz, Dogham & Elcokany, 2019).

Nursing students, as future healthcare professionals, are considered part of the healthcare workforce during clinical training placements, including internships. Internship training serves as the bridge between academic learning and clinical practice, where interns are expected to develop clinical skills. This mandatory program lasts a full 12-month and is required for graduates of nearly all disciplines within the healthcare system (Muhammad, Adesina, 2021).

Internship students are exposed to direct patient contact early in their clinical practice, and due to their limited knowledge and experience with infection control practices, they may become a source of infection transmission (Mubayrik et al., 2021). Controlling and preventing airborne transmission of infections is complex; it involves managing airflow through specially designed ventilation systems, practicing antiseptic techniques, wearing personal protective equipment, and following basic infection prevention measures such as handwashing (Baseer et al., 2016).

With education and training programs, interns become effective advocates and play a crucial role in raising public awareness about infection control measures (Heydari, Partovi, Zarezadeh & Yari 2023). Thus, the undergraduate nursing program must equip intern nurses with the essential knowledge, skills, and attitudes for safe nursing practice (Mubayrik et al., 2021). Therefore, the aim of the study is to evaluate the impact of enforcement of air born infection prevention protocol among internship students.

2. Significance of the study:

Health care workers encounter significant dangers to their own well-being and safety while carrying out both typical and urgent tasks. Airborne diseases are pathogens that can be spread through the air or droplets, posing a hidden danger to healthcare workers and patients. Close to 16 million Americans are employed in the healthcare industry and play a crucial role in addressing public health crises. (Friese & Clever 2020). A study conducted in 2019 among healthcare workers in outpatient clinics found that their laboratory-confirmed influenza rate

was approximately 7.2 to 8.2 percent, slightly surpassing the reported incidence in the general community (Radonovich et al., 2019; Tokars, Olsen & Reed 2018). Providing protection for these essential employees has advantages for patients, healthcare organizations, the broader community, as well as the healthcare workers and their families. Both employers and employees are responsible for enforcing policies and procedures to ensure that healthcare workers are provided and use proper protection at all times during their daily tasks.

3. Aim of the study:

Study aimed to evaluate the impact of applying air born infection prevention protocol among internship students

4. Study objectives:

- To assess internship students' knowledge, practice and attitudes regarding air borne infections.
- Based on identified factors and the results of a learning needs assessment, researchers developed a protocol for airborne infection prevention among internship students.

5. Method

Research Design: A quasi-experimental study was conducted to assess the effectiveness of an airborne infection prevention protocol on internship students.

Research Setting: The research was carried out at Mansoura University's Faculty of Nursing.

Research Subjects: A Convenience sample of 131 internship students affiliated to faculty of nursing included in this study. The sample contained nursing students who prepared to begin internship training, and agree to participate in the study.

Tool of data collection:

One tool was utilized in this research to gather foundational information following a review of recent literature. It was devised by the researchers and segmented into four sections as outlined below (Saveanu et al., 2022; Mare, Shabaan and Abo Gad 2020; Marthoenis and Maskur 2021).

Tool I: A structured questionnaire sheet

Part I: Demographic characteristics were used to identify personal characteristics of the students: age, residency, receiving of training programs related to infection control policies, and past history of airborne infection diseases as a pretest.

Part II: Knowledge assessment sheet was utilized to evaluate nursing students' understanding of airborne infections, covering definitions, transmission modes, vulnerable individuals, policies, and preventative measures during internships. It included 32 multiple choice questions as both a pretest and a posttest.

Scoring system: score one was given for correct answer and zero for incorrect one. Total score point (32) classified as follow:

- Unsatisfactory <60% (score 0 to < 24).

- Satisfactory ≥ 60% (score from 24 to 32).

Part III: Internship nursing students' observational checklist: This section was utilized to evaluate nursing students' internships on their practices of airborne infections. It was made up of 20 things like regulations and precautionary steps. A researcher evaluated it both before and after the test to see if it was conducted correctly or incorrectly.

Scoring system: done properly answer was scored (1) and done improperly answer was scored (0). Total practice score was converted into percentage and categorized as following: ≥75% (≥15) considered a proper level of practice. ≤75 % (≤15) considered as improper level of practice.

Part IV Internship nursing students' attitudes: this part was developed to assess students' attitudes regarding airborne infection measures. It composed of 15 items. Students were asked to score each item on a 5-points Likert Scale ranging from ''agree'' (5 points) to ''disagree'' (1 point) with total scores ranged from 15 to 75. The level of attitude was categorized as Positive (≥75%), and Negative (<75%).

Tool validity:

A jury of five experts in the field of Medical-Surgical Nursing Department tested the content validity of the developed tools and the required modifications were carried out.

Tool Reliability:

Reliability of the Cronbach's alpha value of the Visual analog scale was (α= 0.832).

Pilot study:

The study was carried out on 10% (13 students) of the sample size to confirm the practicality, transparency, significance, thoroughness, accuracy, and relevance of the tool created, in order to make any needed modifications prior to a larger study and to address any unforeseen challenges in data gathering. This subset was not part of the full study sample.

Data collection process:

Phase 1: Preparatory phase:

• Approval from Mansoura University's Faculty of Nursing Research Scientific Ethical Committee was obtained.

• The training program was created according to the specific needs and requests of internship students, taking into consideration the latest relevant literature.

• After an extensive review of recent literature, the researchers developed the tool.

• After analyzing recent literature, the researcher created a colorful brochure. The text was written in basic Arabic and included pictures to aid students in comprehending the material.

• The interns' personal attributes, expertise, experience, and mindset were evaluated with tool one as a pretest regarding airborne infection control and prevention.

• Data was gathered throughout September 2022 for a month, with the researcher arranging meetings with students four days a week from 9:00 AM to 2:00 PM on Saturdays, Sundays, Mondays, and Wednesdays.

Phase II: Implementation phase

• The phase began with the introduction of a training program that spanned 4 weeks, with four sessions (one theoretical, three practical), lasting approximately 20-30 minutes each. Various teaching techniques were employed.

• The researcher conducted individual interviews with students to complete a questionnaire, which took about 20 minutes. Part I, II, and IV were filled out by students online through Google Form, while the researcher completed Part III using an observational checklist.

• The researcher handed out a colorful booklet to each participant.

Phase III: Evaluation phase

Assess the effect of implementing airborne infection prevention protocol on interns by using Tool 1 Part II, III, and IV as a follow-up test.

6. Statistical analysis

The data gathered was arranged, summarized, and statistically evaluated with SPSS software (version 26, SPSS Inc. Chicago, IL, USA). The frequency and percentage were used to represent the categorical variables. Continuous variables were depicted using average and standard deviation. Since the normality assumption was not met at a significance level of $p < 0.05$, the Wilcoxon test was used to compare non-parametric variables (before and after). McNemar's test was utilized to examine the association between the variables in the study. A p-value of 0.01 or lower was deemed to be statistically significant.

7. Ethical consideration and human rights:

Every potential aspect that was important was taken into account. Before the research commenced, all students participating were required to give oral or written consent after being given detailed information about the study's purpose and goals. The researcher stressed that participation is completely optional and the gathered information will be kept confidential and utilized solely for the research. Participants were told they could choose not to take part in the study and could leave at any point. Throughout the entire study, anonymity, privacy, safety, and confidentiality were guaranteed.

Results

Table (1) According to gender, Female gender is more common than male with percentage of 93.9%, with mean age 22.38±0.73 for the studied group. In relation to resident, Aga and El-Senbellawein in most common with percentage of 18.3 % to each other. As regard the history of air born infection 96.9% of studied sample have past history of air born infection. In relation to previous training courses about air born infection 87.8% does not have previous training courses.

Figure (1): shows the knowledge level of the studied internship student's related air born infection pre and post training program. It clarified that 23.70% of study sample have satisfactory level of knowledge regarding air born infection pre training program while, three quarter of them 75 % have satisfactory level of knowledge post training program with high statistical significance difference.

Figure (2): illustrated that 81.7 % of the studied internship student improperly perform practice related air born infection pre training program. On other hand 17.6 "% of the studied internship student improperly perform practice related air born infection post training program Finally there is high statistical significance difference regarding practice level of air born infection.

Figure (3): shows the attitude level of the studied internship student's related air born infection pre and post training program. It observed that improved positive student attitude after training program (50.4% to 82.4%) respectively.

Table (2): notes the mean score of knowledge, practices, and attitudes of the studied internship student's related air born infection pre and post the training program. There is a statistically significant difference of knowledge and attitude related air born infection. On the other hand, there is no statistical significance difference regarding practices related air born infection.

Table (3) shows the relationship between knowledge, practices and attitudes of internship students toward air born infection pre training program. There is statistical significance relation between knowledge and attitude related air born infection. Otherwise, there is no statistical significance relation between knowledge and practice related air born infection. Moreover, no relation was found between practice and attitude related to air born infection.

Table (4) shows the relationship between knowledge, practices and attitudes of internship students toward air born infection post training program. There is statistical significance relation between knowledge and attitude related to air born infection. On the other hand, there is no statistically significant relation between practice and attitude related to airborne infection. Additionally, no relation was found between practice and knowledge related to air born infection.

Table (1): Demographic characteristics of the studied internship students (N=131)

Variables	N	%
Age years :		
Mean ±SD 22.38±0.73		
Gender		
▪ **Male**	8	6.1
▪ **Female**	123	93.9
Past history of air born infection		
▪ **Yes**	127	96.9
▪ **No**	4	3.1
Pervious training courses about air born infection polices		
▪ **Yes**	16	12.2
▪ **No**	115	87.8

Figure (1): Knowledge levels of the studied internship students related air born infection pre and post training program (N=131).
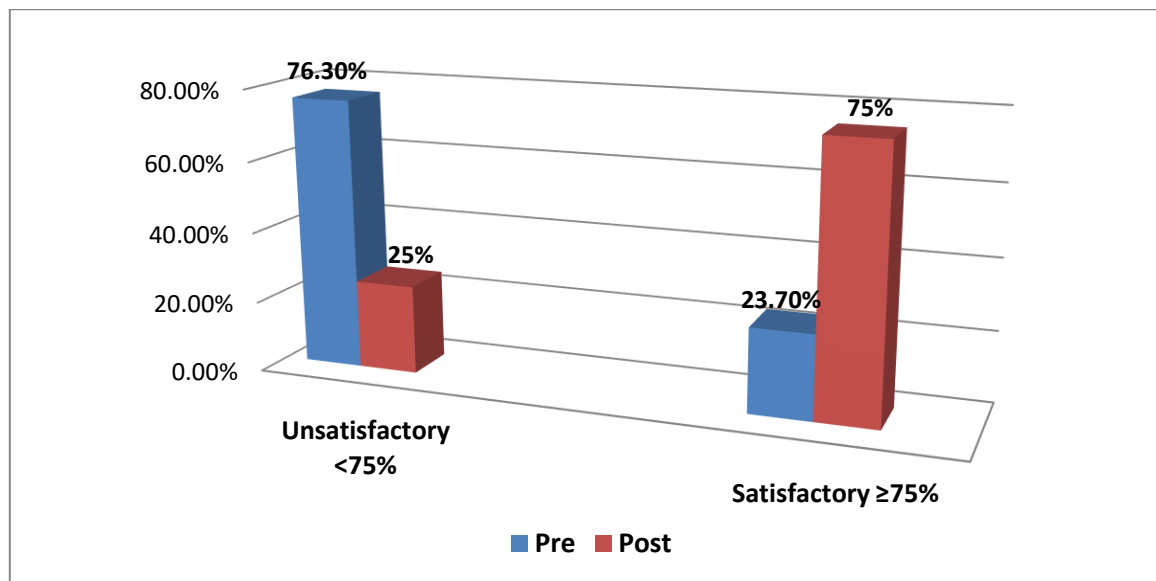

Figure (2): Practice levels of the studied internship students related air born infection pre and post training program (N=131).
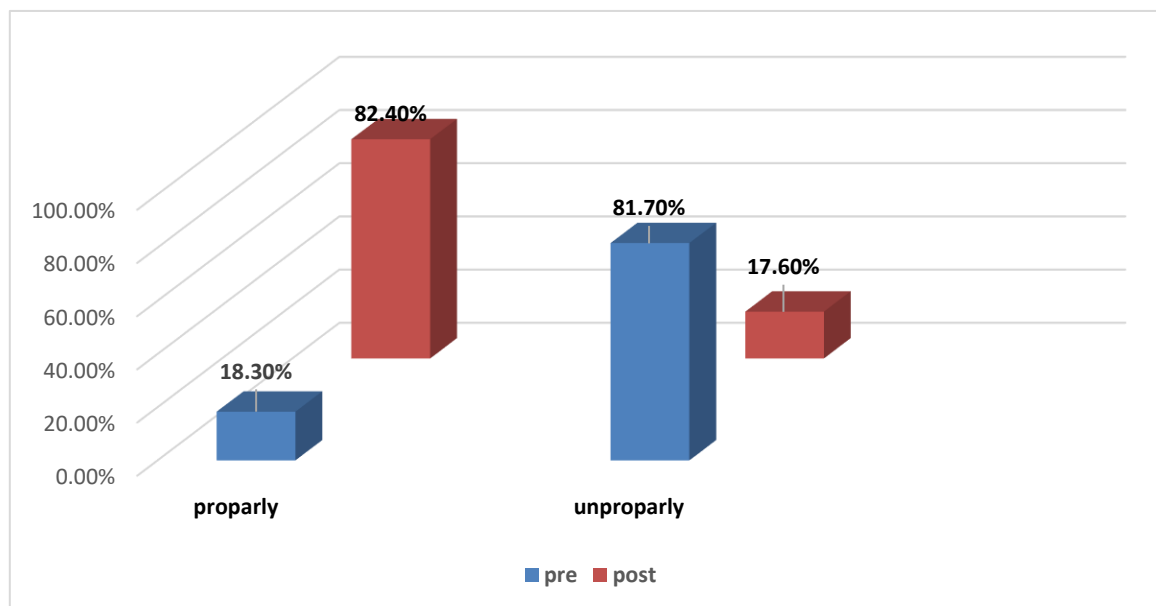
Figure (3): Attitude of the studied intership students toward air born infection before and after training program (n=131).
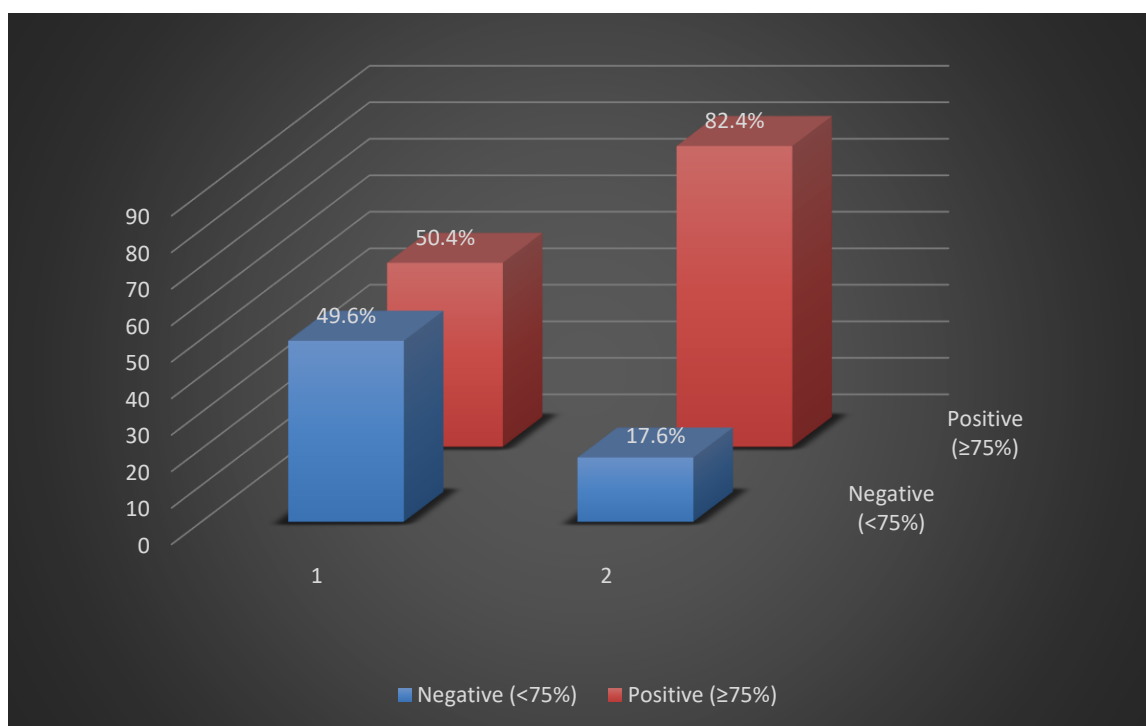

Table (2): Mean knowledge, practices and attitudes of the studied internship student related air born infection pre and post training program (N=131).

variables	Pre	Post	Z	P
	Mean ±SD	Mean ±SD		
A: Knowledge related air born infection	21.933.03	22.95±3.03	3.25	0.001**
B: Practices related air born infection	16.16±2.73	16.65± 2.97	1.75	0.08
C: Attitude related air born infection	58.69±10.13	66.84±9.08	5.88	0.000**

highly statistically significant p $\leq$ 0.000

Table (3) Relationship between knowledge .practices and attitudes of internship students toward air born infection pre training program (n=131).

Variables	Knowledge related air born infection		Practice related air born infection	
	r	p	r	p
Practice related air born infection	0.08	0.36		
Attitude related air born infection	0.28	0.001**	0.05	0.58

highly statistically significant p $\leq$ 0.001

Table (4) Relationship between knowledge, practices and attitudes of internship students toward air born infection post training program (n=131).

Variables	Knowledge related air born infection		Practice related air born infection	
	r	p	r	p
Practice related air born infection	0.06	0.52		
Attitude related air born infection	0.31	0.000**	0.07	0.46

highly statistically significant p ≤ 0.000

Discussion:

Key issues include the infection and illness of healthcare workers, as well as the spread of illness within healthcare facilities. Healthcare workers are on the front lines of providing patient care. Each nation dedicates significant time and resources to the education of healthcare professionals, essential members of the community (**Kamali Haghighi et al., 2020**). Ultimately, due to various factors like understaffing, outbreaks of infectious diseases, direct contact with patients, and changing climates, most medical students today will be at risk of contracting infections. Currently, nurses' trainees require assistance from mentors and educational initiatives to navigate the distinct challenges (**Habiba, Moustafa & Moussa, 2020).** So, the current study aimed to evaluate the effect of training programs on knowledge, practices, and attitudes of internship students toward airborne infections prevention.

The demographic characteristics of the internship students showed that most of the sample were females. In the same line, **Albaqawi et al., (2020)** stated that more than two-thirds of the nursing students were female. The restriction of nursing education to women in Egypt, which could explain this. On the other hand, a study conducted in Turkey by **Çalışkan et al., (2020)** Stated that 50% of the medical students were male.

In terms of age, the study found that the average age of the sample was twenty-two point thirty-eight. A study from China was closely examined **Chen et al., (2020)** Stated that the mean age of the nursing interns is twenty point nine. A past history of air born infection was found in three quarters of the studied sample, while an Iranian study conducted by **Sheibani, Ghelbash & Sarani, (2021)** described that nearly half of final-year nursing students infected. In contrast, Egyptian study by **Habiba, Moustafa & Moussa, (2020)** stated that most nursing interns had not been exposed to infections. This outcome could be linked to interacting with patients during clinical rotations throughout the faculty years.

Most internship students lack previous training in air born infection despite attending previous training courses on the topic. Likewise, a research project carried out in Saudi Arabia made by **Albaqawi et al., (2020)** stated that most nursing students mentioned they were not taught about airborne infections in any of their nursing classes. Conversely, **Taghrir, Borazjani & Shiraly, (2020)** reported that half of the students including interns had training programs. Also, an Egyptian study prepared by **Risk & Siam, (2021)** demonstrated that almost half of nurses received

education on standard precautions for airborne infections. This might stem from a lack of the necessary training program or being occupied with multiple courses during their college years.

Regarding knowledge, the current study found a significant difference in knowledge levels on airborne infections before and after the training program. Similarly, an Egyptian study made by **Elfattah, Elsabagh, Abdelmonem & Ahmed, (2021)** reported that there was a significant statistical difference in knowledge levels regarding airborne infections before and after an educational program among nurses. Also, an Egyptian study conducted by **Habiba, Moustafa& Moussa, (2020)** Informed that there was a significant increase in nurses' intern knowledge following the training program compared to before. One possible reason for this improvement could be that the program exposed nurse interns to a significant amount of information about airborne infections (such as how they are transmitted, their symptoms, and complications) and utilized engaging teaching techniques.

The study found a significant statistical difference in practice levels for air born infection before and after the training program. This in the same line with an Egyptian study made by **Said, Abd Elhakam & Abd Elmoneim, (2021**) There was significant statistical evidence in all areas concerning nurses' reported adherence to infection control practices for precautionary and preventive measures during airborne infections, with the exception of hand hygiene when dealing with airborne infection patients.

The research verified a notable statistical disparity in attitude before and after the training course. This result, disagree with study by **Huynh, Nguyen, & Pham, (2020)** Who noted that before the intervention, most healthcare workers had a positive attitude and good knowledge regarding airborne infections. Moreover, study conducted by **Elgzar, Al-Qahtani, Elfeki & Ibrahim, (2020)** who stated that after the intervention, notable disparities were seen in the knowledge and attitude of student nurses in the control and intervention groups.

In relation to the knowledge, practices, and attitudes of internship students studying air borne infections before and after the training program. The study found a significant relationship between knowledge and attitude towards airborne infections following the training program. Likewise, **Almohammed et al., (2021)** Stated that a strong correlation was found between knowledge and attitude scales regarding air borne infection among healthcare workers in Saudi Arabia. Although the correlation between the attitude and practice scales was positive, it was weak. Also, **Limbu, Piryani & Sunny, (2020)** discovered a significant relationship between the attitude and knowledge of healthcare workers.

Another key discovery was the lack of a significant statistical relationship between attitudes and practices regarding airborne infection before and after the training program. Contrary to **Papagiannis et al., (2020)** Suggested that nurses with excellent knowledge held a favorable perception and were likely to implement additional preventative measures. The attitudes score showed a strong correlation with the practices score. Additionally, study conducted by **Alahdal, Basingab & Alotaibi, (2020)** It was reported that a strong positive connection was discovered between knowledge and attitude about airborne infections and actual practices. Also, **Elpasiony, Mostafa & Gabr, (2021**) It was discovered that during the pre-program period, nurses exhibited a notable negative correlation between their knowledge and their practices, indicating that while they had knowledge, their practices did not align with this level. Furthermore, **Taghrir, Borazjani, & Shiraly, (2020)** who discovered a link between students' awareness and preventive measures for airborne illnesses.

Conclusion: A significant difference was found in level of knowledge, practice and attitude post applying airborne infection protocol.

Recommendations: The research shows that the studied group lacks knowledge. It is necessary to include relevant topics in the school curriculum in order to give students sufficient knowledge and hands-on experience in their foundational years through various engaging teaching methods.

References:

1. Abdelaziz, T., Dogham, R., & Elcokany, N. (2019). Infection prevention and control curriculum in undergraduate nursing program: Internship nursing students' perspectives. *Journal of Nursing Education and Practice*, 9(10).
2. Alahdal, H., Basingab, F., & Alotaibi, R. (2020). An analytical study on the awareness, attitude and practice during the Air born infection in Riyadh, Saudi Arabia. *Journal of infection and public health*, 13(10), 1446-1452.
3. Albaqawi, H. M., Alquwez, N., Balay-Odao, E., Bajet, J. B., Alabdulaziz, H., Alsolami, F., ... & Cruz, J. P. (2020). Nursing Students' Perceptions, Knowledge, and Preventive Behaviors Toward COVID-19: A Multi-University Study. *Frontiers in public health*, 8.
4. Almohammed, O. A., Aldwihi, L. A., Alragas, A. M., Almoteer, A. I., Gopalakrishnan, S., & Alqahtani, N. M. (2021). Knowledge, attitude, and practices associated With COVID 19 among healthcare workers in hospitals: a cross-sectional study in Saudi Arabia. *Frontiers in public health*, 9, 1007.
5. Baseer, M. A., Ansari, S. H., AlShamrani, S. S., Alakras, A. R., Mahrous, R., & Alenazi, A. M. (2016). Awareness of droplet and airborne isolation precautions among dental health professionals during the outbreak of corona virus infection in Riyadh city, Saudi Arabia. Journal of clinical and experimental dentistry, 8(4), e379.
6. Bhardwaj, S. K., Bhardwaj, N., Kumar, V., Bhatt, D., Azzouz, A., Bhaumik, J., ... & Deep, A. (2021). Recent progress in nanomaterial-based sensing of airborne viral and bacterial pathogens. Environment international, 146, 106183.
7. Çalışkan, F., Mıdık, Ö., Baykan, Z., Şenol, Y., Tanrıverdi, E. Ç., Tengiz, F. İ., & Gayef, A. (2020). The knowledge level and perceptions toward COVID-19 among Turkish final year medical students. Postgraduate Medicine, 132(8), 764-772.
8. Chen, Y., Zhang, H., Xu, Y., Xu, F., Wang, Y., & Cao, Y. (2020). Psychological and behavioral responses of nursing interns from 12 Chinese universities during the COVID-19 epidemic: a knowledge, attitude and practice survey.
9. Elfattah, G. A., Elsabagh, N. E., Abdelmonem, A. F., & Ahmed, A. A. (2021). Impact of Educational Intervention on Nurses' Knowledge, Practice and Attitude Related Prevention Measures of COVID 19. Indian Journal of Forensic Medicine & Toxicology, 15(3).
10. Elgzar, W. T., Al-Qahtani, A. M., Elfeki, N. K., & Ibrahim, H. A. (2020). COVID-19 Outbreak: Effect of an Educational Intervention Based on Health Belief Model on Nursing Students' Awareness and Health Beliefs at Najran University, Kingdom of Saudi Arabia. African journal of reproductive health, 24(2), 78-86.
11. Elpasiony, N. M., Mostafa, M. F., & Gabr, W. F.(2021). Efficacy of COVID-19 Prevention Educational Program on Nurses' knowledge and Practices at Hemodialysis Unit.
12. Friese, C. R., & Clever, L. H. (2020). Protecting health care workers from transmissible airbornediseases: challenges and opportunities. NAM perspectives, 2020.
13. Gammon, J., & Hunt, J. (2018). A review of isolation practices and procedures in healthcare settings. British Journal of Nursing, 27(3), 137-140.
14. Habiba, A. I. A., Moustafa, A. A. A. E., & Moussa, A. A. A. E. N.(2020). Effect of Mentoring Program on Nurses Interns' knowledge, Attitudes, Safety Practices, and Psychological Readiness toward Air born infection.

15. Heydari, A., Partovi, P., Zarezadeh, Y., & Yari, A. (2023). Exploring medical students' perceptions and understanding of the health impacts of climate change: a qualitative content analysis. BMC Medical Education, 23(1), 774.

16. Huynh, G., Nguyen, T. N. H., Vo, K. N., & Pham, L. A. (2020). Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. Asian Pacific Journal of Tropical Medicine, 13(6), 260.

17. Kamali Haghighi, F., Kouhi, P., Amini, M., Mohammadkarimi, V., Sepehrpoor, M., Hosseini, S. A., ... & Sadeghi Boogar, S. (2020). Knowledge, Attitude, and Practice Toward COVID-19 Among Healthcare Workers in Shiraz, Iran. Shiraz E-Medical Journal, 21(12).

18. Limbu, D. K., Piryani, R. M., & Sunny, A. K. (2020). Healthcare workers' knowledge, attitude and practices during the Air born infection response in a tertiary care hospital of Nepal. PloS one, 15(11), e0242126.

19. Marey, R. M., Shabaan, F. M., & Abo Gad, R. A. (2020). Efficacy of implementation management program about infection control practices for nursing staff. Tanta Scientific Nursing Journal, 18(1), 41-82.

20. Marthoenis, M., & Maskur, M. (2021). Knowledge, attitude, and practice of nurses toward COVID-19: A cross-sectional study in a referral hospital of Indonesia. Iranian Journal of Nursing and Midwifery Research, 26(6), 569-572.

21. Mubayrik, A. B., Al Dosary, S., Alwasil, W., AlShanqeeti, B., Alkathiri, M., Alahmari, R., & Sultan, S. B. (2021). Knowledge and Practice of COVID-19 Infection Control Among Dental Students and Interns: A Cross-Sectional Survey. Advances in Medical Education and Practice, 12, 1419.

22. Muhammad DG, Adesina MA (2021). Effect of Covid-19 pandemic on internship training in Nigeria. Yen Med J. 2021;3(2):83–84

23. Nelson, K. E., & Williams, C. M. (Eds.). (2014). Infectious disease epidemiology: theory and practice. Jones & Bartlett Publishers.

24. Papagiannis, D., Malli, F., Raptis, D. G., Papathanasiou, I. V., Fradelos, E. C., Daniil, Z., ... & Gourgoulianis, K. I. (2020). Assessment of knowledge, attitudes, and practices towards new coronavirus (SARS-CoV-2) of health care professionals in Greece before the outbreak period. International journal of environmental research and public health, 17(14), 4925.

25. Radonovich, L. J., Simberkoff, M. S., Bessesen, M. T., Brown, A. C., Cummings, D. A., Gaydos, C. A., ... & Perl, T. M. (2019). N95 respirators vs medical masks for preventing influenza among health care personnel: a randomized clinical trial. Jama, 322(9), 824 833.

26. Rizk, S., & Siam, B. (2021). Effect of Tele-nursing Education Program on Nurses' Compliance with Standard Precautions during Air born infection. Assiut Scientific Nursing Journal, 9(25), 10-19.

27. Said, A. R., Abd Elhakam, E. M., & Abd Elmoneim, S. O. (2021). Educational Program For Maternity Nurses Regarding Precautionary And Preventive Measures At Labor Unit During COVID 19. International Journal of Management, 12(2).

28. Saveanu, C. I., Meslec, M. D., Saveanu, A. E., Anistoroaei, D., Bobu, L., Balcos, C., & Tanculescu, O. (2022). Knowledge Level on Infection Control among Romanian Undergraduate and Postgraduate Dental Students. Medicina, 58(5), 661.

29. Sheibani, S., Ghelbash, Z., & Sarani, S. Y. H. (2021). Investigating General Health and Its Related Factors in Final Year Nursing Students during the Air born infection. European Journal of Molecular & Clinical Medicine, 8(1), 2245-2252.

30. Taghrir, M. H., Borazjani, R., & Shiraly, R. (2020). COVID-19 and Iranian medical students; a survey on their related-knowledge, preventive behaviors and risk perception. Archives of Iranian medicine, 23(4), 249-254.

31. Tokars, J. I., Olsen, S. J., & Reed, C. (2018). Seasonal incidence of symptomatic influenza in the United States. Clinical Infectious Diseases, 66(10), 1511-1518.

الملخص العربى

تطبيق بروتوكول الوقاية من العدوى المنقولة عبر الهواء بين طلاب الامتياز

مقدمه: العدوى المحمولة جواً هي أي مرض تسببه كائنات دقيقة تنتقل عبر الهواء. يلعب التعليم دورًا مهمًا في تحسين المعرفة والمهارات والمواقف المتعلقة بالوقاية من العدوى المحمولة جواً.

أهداف الدراسة: تطبيق بروتوكول للوقاية من العدوى المحمولة جواً بين طلاب الامتياز.

مكان الإعداد: أجريت الدراسة في كلية التمريض، جامعة المنصورة، مصر.

عينه البحث: عينة مكونة من (131) طالباً من طلاب الامتياز، شملتهم الدراسة الحالية.

الأداة: تم استخدام ورقة استبيان تم تطويرها من قبل الباحثين استنادًا إلى مراجعة الأدبيات ذات الصلة، لجمع البيانات وهي الديموغرافية والمعرفة والممارسة وموقف الطلاب تجاه العدوى المحمولة جواً.

النتائج والاستنتاج: تم العثور على اختلاف كبير في مستوى المعرفة والممارسة والمواقف بعد تطبيق بروتوكول العدوى المحمولة جوا. تحليل ومقارنة البيانات يعني أن هناك فرق ذو دلالة إحصائية فيما يتعلق بالموقف الإيجابي قد زاد من 50.4% قبل إلى 82.4% بعد تطبيق البروتوكول.

التوصيات: تعكس الدراسة أن هناك ندرة معرفية لدى مجموعة الدراسة. هناك حاجة إلى دمج القضايا المعنية في المناهج الأكاديمية لتزويد الطلاب بالمعرفة والمعلومات الكافية خلال سنوات تكوينهم