Original Article

An Agreement Among Nurse Educators on Infection Prevention and Control Practices to Ensure Safe Clinical Training Post-COVID-19

Lourance Al Hadid[1], Marwa Al Barmawi[2], Omar Al-Rawajfah[3], Ahmad Al-Sagarat[4]

[1]Faculty of Nursing, Al-Balqa Applied University, Salt, Jordan, [2]Department of Nursing, Faculty of Nursing, Alzaytoonah University of Jordan (ZUJ), Jordan, [3]Department of Nursing, College of Nursing, Sultan Qaboos University, Sultanate of Oman, [4]Community and Psychiatric Nursing Department, Faculty of Nursing, Mutah University, Al Karak, Jordan

Abstract

Background: Infection Prevention and Control (IPC) practices during nursing students' clinical training are based on standardized precautions. However, the spread of COVID-19 raised the need to revise these practices. We aimed in this study to assess nurse educators' agreement on items that represent precautionary guidelines, which enhance safety during clinical training of students. It aimed to reach an agreement among nurse educators on IPC practices to ensure safe clinical training. **Materials and Methods:** This descriptive explorative, cross-sectional study included 243 Jordanian and Omani educators. The study questionnaire was based mainly on evidence reported in the literature. The study questionnaire comprised items for trainers to practice and items to supervise students. It was developed based on available evidence and recommended training practices during COVID-19 suggested by the WHO and the literature. Both the face and content validity processes were adopted to validate the study questionnaire. The final version was composed of 26 items for trainers and 20 items for students subsumed in the following themes: protecting self, protecting others, and essential training needs. **Results:** All questionnaire items were rated above the midpoint indicating agreement among participants on including the new IPC practices. All suggested practices (26 items for the trainers and 20 items for the students) were supported by the study participants. **Conclusions:** Clinical training is an important component of nursing students' preparation. Findings suggest the importance of adding new IPC practices to improve student IPC practices, protect themselves and others, minimize cross-infections, and enhance students' training within a safe clinical environment.

Keywords: *Clinical practicum, health educators, infection control, nursing, students*

Introduction

During the late months of 2019, China's mainland witnessed the spread of a new form of virus, which turned out to be a corona-type virus, then called COVID-19.[1] The world after this pandemic is not like what it used to be. This pandemic has affected all industries, including nursing education and practice. Among the changes expected to form nursing education is the Infection Prevention and Control (IPC) guidelines adopted to ensure students', educators', nurses', and patients' safety during clinical training in healthcare facilities or laboratory settings. Nursing students participate in clinical training as a mandatory component of the curriculum. Nursing knowledge and skills are usually utilized during clinical training, which is essential to determining the outcome of nursing education.[2] Therefore, focusing on clinical training and improving students' knowledge are important to ensure safe practice, which involves the patient, the nurses, and other Healthcare Workers (HCWs).[3] Nursing students should train in a well-structured and safe environment to ensure that they achieve the clinical objectives and keep students from being exposed to or causing a harmful situation.[4] Therefore, updating IPC guidelines during the pandemic became an essential process to ensure safe clinical training for students, trainers, other HCWs, patients, and family members. This need is especially true after COVID-19, which influenced how HCWs viewed and perceived the importance of preventive measures to avoid being infected or a carrier of the infection.

Approximately 7–10% of patients admitted to acute care hospitals acquire an infection,[5] which leads to increased cost, morbidity, and mortality rates.[6] Compliance of HCWs and nursing students was recognized as an efficient means to

How to cite this article: Al Hadid L, Al Barmawi M, Al-Rawajfah O, Al-Sagarat A. An agreement among nurse educators on infection prevention and control practices to ensure safe clinical training post-COVID-19. Iran J Nurs Midwifery Res 2024;29:85-90.

Submitted: 05-Nov-2021. **Revised:** 08-May-2023. **Accepted:** 08-Sep-2023. **Published:** 09-Jan-2024.

Address for correspondence:
Dr. Lourance Al Hadid, Faculty of Nursing, Al Balqa Applied University, Postal Code 19117, P.O. Box 206, Salt, Jordan.
E-mail: l.hadid@bau.edu.jo

Access this article online

Website: https://journals.lww.com/jnmr

DOI: 10.4103/ijnmr.ijnmr_415_21

Quick Response Code:

prevent and control cross-infections.[7] The COVID-19 pandemic has alerted the healthcare sector to different methods to manage cross-infections among HCWs and all members of the healthcare teams, including nursing students. Therefore, it was necessary to consider practice guidelines that govern IPC policies in nursing education as uncertainty about the efficacy of the current guidelines in preventing cross-infection might be present. This assumption is especially true after the COVID-19 pandemic and the level of uncertainty about its nature, particularly at the beginning of the pandemic.

Nurse educators know the environment where students train, and they are aware of the IPC guidelines. Therefore, their expertise represents a rich source that can provide a refined view of what to include in the sought IPC guidelines. These measures protect the students and the patient, and all individuals involved directly or indirectly in student training. We proposed this study to assess how much the educators agree with a group of suggested changes in IPC guidelines that aim to improve practices implemented during training nursing students. The findings in this study would support the development of IPC guidelines for safer clinical training.

We aimed to assess NE's agreement on items that represent precautionary guidelines, which would enhance the safety environment of the clinical training process during COVID-19 or possible future pandemics. We also aimed to present the items of IPC approved by NE, which could become guidelines adopted and implemented in clinical and lab training of students in a situation like the COVID-19 pandemic.

Materials and Methods

This descriptive explorative, cross-sectional study investigated what changes NE believed were necessary to ensure a safe, infection-free environment for nursing students and educators. Data were collected between October 2021 and April 2022.

Participants were recruited through convenience sampling from different 4-year nursing programs in the Hashemite Kingdom of Jordan and the Sultanate of Oman. They were recruited via electronic mail using electronic forms. Junior or senior nursing educators and trainers, who were engaged in clinical practice or laboratory training during the last 12 months and more, were invited to participate in this study.

The sample size was calculated using the G-Power 3.1 software with a significance level of 0.05 for the analysis of variance (ANOVA), an average effect size of 0.15, and a power of 0.95,[8] and the required number was 134.

The study questionnaire was developed based on the most available evidence and recommended training practices during COVID-19 suggested by the WHO[9] and the literature.[10,11] The study questionnaire was developed into two main sections. The first section addresses IPC precautionary practices for students and the second section addresses trainers' IPC precautionary practices. Items were reviewed by six Ph.D.-prepared NEs, who were experts in infection control, and two master's degrees. As modifications suggested by the reviewers were incorporated, items were pilot tested for clarity and readability among 12 NEs.

We adopted a Content Validity Index (CVI), a commonly used method that determines item relevancy in a newly developed study questionnaire. Experts assessed the relevancy of questionnaire items on a 4-point Likert scale (nonrelevant 1 to quite relevant 4). Both scale CVI (SCVI) and item CVI (ICVI) were computed by summating the responses. We used universal agreement (SCVI-UA) and content validity average (CVI-Avg), and among experts for the items. ICVI values greater than 0.74 indicated that the item was relevant, values between 0.60 and 0.74 showed that the item needed revisions, and if the value was below 0.60, the item was eliminated.[12] Similarly, SCVI is calculated using the number of items in a tool that has achieved a "relevant" rating.[13] SCV-UA was calculated by adding all items with ICVI equal to 1 divided by the total number of items. The SCVI-Avg was calculated by dividing the sum of the ICVIs by the total number of items.[13,14] An SCVI-UA $\geq$ 0.8 and an SCVI-Avg $\geq$0.90 have excellent content validity.[14]

We measured item essentiality using the Content Validity Ratio (CVR). Independently, each panelist was invited to rate his/her judgment of an item from one to three (nonessential 1 to essential 3); then CVR was calculated by this formula ($CVR = (Ne - N/2)/N/2$), where *Ne* refers to the number of panelists indicating an item as "essential" and *N* is the total number of panelists. CVR varies between 1 and −1, and a higher score indicates greater agreement among panel members. The minimum accepted value of CVR is 0.59 determined by Lawshe's table for eight panelists.[15]

The response process (face validity) was quantified by computing FVI for item clarity and comprehension, like CVI. The 12 raters rated the evaluation on a 4-point scale ranging from 1 = not clear to 4 = very clear, and the importance of each item on a 4-point Likert scale (not important to very important). Item impact score was calculated according to the formula (impact score = frequency (%) × importance item score), where the frequency is the percent of raters, scoring 3 or 4 "important," and importance is the average score of the item based on the Likert scale. The evaluation criteria depend on the value of the item impact score. In our case, only scores equal to more than the midpoint ($\geq$1.5) were kept.[13] In the final draft, 26 items for the trainers and 20 items for the students were included in the questionnaire.

The final version was composed of 26 items for the trainers and 20 items for the students as follows: protecting self (20

items), protecting others (11 items), and essential training needs (15 items).

Participants' responses were divided on these themes and then the total reflected the whole perspective of NEs. The study participants were asked to rate each item on a 4-point Likert scale, ranging from not necessary (1) to always necessary (4) to assess the consensus for each proposed item. The mean score was calculated for each individual item. The consensus was considered for items that achieved mean scores of ≥2.00. Items with mean scores less than 2.00 were excluded from the final list, which indicates no agreement among the NEs.

The final version was composed of 26 items for the trainers and 20 items for the students as follows: protecting self (20 items), protecting others (11 items), and essential training needs (15 items).

Participants' responses were divided on these themes and then the total reflected the whole perspective of NEs. The study participants were asked to rate each item on a 4-point Likert scale, ranging from 1 = not necessary to 4 = always necessary to assess the consensus for each proposed item. The mean score was calculated for each individual item. The consensus was considered for items that achieved mean scores of ≥2.00. Items with mean scores less than 2.00 were excluded from the final list, which indicates no agreement among the NEs.

Data were analyzed using SPSS version 25 (Armonk, NY: IBM Corp, 2017), including means, standard deviation, scores of the items and their corresponding themes, and normality tests. No missing data were observed in the data, and ANOVA and *t*-tests were used. Internal consistency was measured using Cronbach's alpha.

Ethical considerations

This study has been approved by the institutional review board of the university of affiliation (03/421/2019–2020) from the Hashemite Kingdom of Jordan and from the Omani Ministry of Health (OCHS/REC/PROPSAL-APPROVED/13/2020). The authors have obtained all appropriate consent from all the participants.

Results

Sample characteristics

A total of 243 NE filled the study instrument, of which 180 (74.1%) were female, with a mean(SD) age of 41.5 (8.20) and 186 (76.50%) aged between 31 and 50. More than half of the participants had master's degrees (n = 129, 53.10%). Many participants (n = 128, 52.90%) specialized in adult health nursing or general nursing. The experience of the participants ranged between 3 and 38 years, with a mean(SD) of 13.00 (7.43) [Table 1].

Findings of the study questionnaire

Table 2 illustrates the findings and shows that the mean score on the questionnaire is high, which indicates that NE supported the proposed guideline items making the study questionnaire. All suggested practices (26 items for the trainers and 20 items for the students) were supported by the study participants, as the mean score for all the suggested items was greater than the midpoint of 2.00. For the trainer's guideline items, the highest mean score was "Trainers should wear a mask while training students" (M = 3.71, SD = 0.65) [Table 2], while the lowest mean score was "Trainer stays with students while caring for patients" Mean (SD) 3.26 (0.75). For the student's suggested items, the highest mean score was "Students maintain physical distancing with other students, minimum 3 feet" Mean (SD) 3.71(0.65), while the lowest mean score was "Students train in all departments, including closed units, such as the Intensive Care Units (ICUs) and the Neonatal Intensive Care Units (NICUs)" Mean (SD) 2.91(0.91).

The total mean score for the trainer and student sections was computed. These total mean scores reflect the level of support of the NE for the proposed practice guidelines. For the trainer section, the total mean(SD) score was 88.79 (11.55) out of 104 with a range between 51 and 100, and these values show that all responses were above the midpoint. This finding can also be seen in the student

Table 1: Sample characteristics (n=243)

Characteristic	*n* (%)
Gender	
Female	180 (74.10%)
Male	63 (25.90%)
Age: Mean (SD) 41.5 y/o (8.20)	
20–30	22 (9.10%)
31–40	96 (39.50%)
41–50	90 (37.00%)
51–60	35 (14.40%)
Academic degree	
Baccalaureate	51 (21.00%)
Master	129 (53.10%)
Ph.D.	63 (25.90%)
Nursing specialization	
Adult	128 (52.90%)
Maternity	46 (18.90%)
Pediatric	45 (18.50%)
Psychiatric	18 (7.40%)
Community	6 (20.20%)
Years of experience: Mean=13.00, SD=7.43	
1–5	49 (20.20%)
6–10	52 (21.40%)
11–15	61 (25.40%)
16–20	51 (21.00%)
<20	30 (12.30%)

Table 2: Educators' responses on the IPC* practice guidelines for trainers and students (*n*=243)

Theme	Item	Mean (SD)
Total (46 items)	Mean=157.90, SD=21.44), α** 0.93	
Practices to protect self Mean (SD) 71.45 (10.19),α 0.88	Trainer's practice guidelines	
	Trainer maintains physical distancing between me and the students (minimum of 3 ft.)	3.66 (0.64)
	Trainer keeps alcohol (hygienic) sanitizers in my pocket	3.58 (0.64)
	Trainer prepares students to deal with patients with infectious diseases, including COVID-19	3.53 (0.76)
	Trainer emphasizes that students use cleanable personal belongings with sanitizers during the clinical day	3.60 (0.68)
	Trainer makes sure that lab is cleaned after each use with the recommended materials	3.69 (0.62)
	Trainer assesses each patient before assigning to students	3.54 (0.76)
	Trainer checks for the use of appropriate PPE for each department prior to sending students	3.61 (0.69)
	Trainer performs hand washing at the beginning and end of each clinical day before students	3.60 (0.76)
	Trainer emphasizes that bringing food to clinical setting/laboratory is prohibited	3.39 (0.87)
	Student's practice guidelines	
	Students maintain physical distancing with other students (minimum 3 ft)	3.70 (0.15)
	Students perform handwashing prior to working with patients in the setting/laboratory	3.70 (0.68)
	Students perform handwashing each time they leave the clinical setting/laboratory	3.63 (0.78)
	Students put on a face mask while in a clinical setting/laboratory	3.65 (0.75)
	Students put on disposable/latex gloves while in a clinical setting/laboratory	3.44 (0.89)
	Students put on disposable gowns while in the clinical setting	3.36 (0.87)
	Students are accompanied (attended) by a trainer when caring for patients	3.32 (0.80)
	Students keep alcohol (hygienic) sanitizers/scrubs in their pockets	3.54 (0.79)
	Students' temperature is checked prior to each clinical day	3.56 (0.80)
	Students clean all belongings used during the clinical day prior to leaving the setting	3.58 (0.73)
	Students do not share personal belongings with each other (stationery, stethoscope, etc.)	3.64 (0.71)
Practices to protect others Mean (SD) 38.42 (5.89), α 0.67	Trainer's practice guidelines	
	The trainer should be tested for COVID-19 before going to clinical setting/laboratory	3.39 (0.94)
	If a trainer has respiratory symptoms, she or he abstains from training	3.48 (0.87)
	Trainer wears a mask while training students	3.71 (0.65)
	Trainer puts on disposable/latex gloves when training students	3.36 (0.92)
	Trainer dresses a special dress/coat for the clinical setting and takes it off once finished	3.56 (0.80)
	Trainer emphasizes IPC guidelines prior to each clinical day as a reminder to students	3.61 (0.65)
	Trainer prepares IPC educational pocket card to all students	3.37 (0.83)
	Trainer explains to students how to use personal protective equipment (e.g., gloves, mask, and gown/apron, goggles) as indicated in the guidelines	3.66 (0.63)
	Trainer stays with students while caring for patients	3.26 (0.75)
	Trainer assigns students to patients, who do not have respiratory symptoms	3.41 (0.86)
	Student's practice guidelines	
	Students are tested for respiratory symptoms before going to a clinical setting/laboratory	3.44 (86)
Essential practice needs Mean (SD) 41.19 (5.94), α 0.844	Trainer practice guidelines	
	The trainer needs to have enough information about COVID-19 to ensure safe practice	3.71 (0.68)
	Policies about COVID-19 are adequate to keep trainers and students safe	3.47 (0.83)
	Trainer receives training on how to deal with a patient with COVID-19/infectious disease	3.58 (0.76)
	Trainer conducts training on infection prevention and control (IPC) guidelines before the beginning of each clinical course/semester	3.65 (0.61)
	Trainer explains principles of visual triaging to students during laboratory training	3.59 (0.64)
	Trainer explains why a student with respiratory symptoms needs to leave the setting/laboratory (e.g., fever, coughing, sore throat)	3.68 (0.64)
	Trainer revises the IPC protocols at the beginning of each semester	3.63 (0.66)
	Student's practice guidelines	
	Students pass an IPC exam prior to joining the clinical course	3.38 (0.84)
	Students have the IPC educational pocket card prior to each clinical day	3.40 (0.82)
	Students are tested for IPC knowledge and skills at the beginning of the clinical training	3.51 (0.74)
	Students' knowledge about visual triaging is tested during preparatory laboratory	3.48 (0.76)
	Students breaching IPC guidelines undergo further laboratory training for two clinical days	3.38 (0.79)
	Students acknowledge the procedure followed if they complain of respiratory symptoms	3.63 (0.70)
	Students train in all departments, including the closed units (ICU, NICU)	2.91 (0.91)
	Students provide care to all patients, including those who have respiratory symptoms	2.68 (1.10)

*Infection prevention and control. **Cronbach's alpha

section, where the total mean score was 68.95 out of 80 (SD = 10.21) with a range between 27 and 80.

The midpoint of the total score in this study was 92 (range 46–184), and the mean score of the questionnaire was 157.90. Similar results can be noticed in the other themes, which also had high mean scores, indicating the support of trainers on the suggested IPC items in the study questionnaire. For instance, "protecting self" included 20 items and the mean score was 71.45, while the theoretical mean score was 50 (range 20–80). This also applies to the other themes [Table 2]. The theoretical midpoint for "protecting others," which was represented by 11 items, was 27.5 (range 11–44), but the mean score was 38.42. The third theme "essentials practice needs" was subsumed by 15 items and had a midpoint of 30, but the mean score was 41.19. These scores generally indicate an inclination toward supporting the suggested changes in clinical practice as they depart positively away from the midpoint to reflect higher means.

To sum up, the scores on the total and themes of the study questionnaire indicate that NE support changes in the current clinical practice, which aim to ensure adherence to the IPC's new practice guidelines.

Discussion

During the first half of the year 2020, many nursing programs around the world stopped students' training in laboratories and clinical settings as COVID-19 was sweeping. The threat of this pandemic did not disappear to date (during the writing of this report). However, questions can be raised on whether training would be the same as before COVID-19 when students and NE resume training in the laboratory and clinical areas; we might even witness comparable conditions in the future. Therefore, the present study examined how NE involved in clinical and laboratory training expect changes in terms of IPC practices when resuming clinical training and to prepare students for any future pandemics after graduation. To avoid any accidental spread of COVID-19 among trainers and students, there is a need to set realistic and effective measures to ensure safe training for all involved, including nurses and patients, especially as some programs have adopted early deployment of students.[12]

Findings in this study showed that trainers supported changes in the IPC practices as suggested in the study questionnaire. The need for these changes can become more persisting as the new academic year in many areas around the world is approaching and the pandemic is still hitting those countries. Response on the theme "protecting self" showed trainers' concern about contracting COVID-19, and what practices were perceived as important to avoid contracting an infection, such as physical distancing, the use of sanitizers, and what ensures readiness for any outbreaks in the future.

Most trainers supported the items, which would ensure personal safety. Although studies emphasized the importance of protective measures, adherence to students using them was not satisfactory.[13,14] Therefore, our findings emphasize the need for trainers to remind students prior to each clinical day of the measures they must follow to avoid cross-infections.

The second theme, "protecting others," addresses how educators ensure training students safely without causing any IPC breach, which includes training students on standard precautions and directing students when providing care to patients and family members. Students do not follow standard precautions unless they are followed by trainers.[15,16] We found that the trainers agreed on the need to keep students aware of the need to use personal protective equipment and sanitizers to protect others from contracting cross-infection through those students.

Our findings also emphasize what the literature reported about the need to have a component of IPC prior to clinical training.[17] However, trainers believed that the need for this component extended to each clinical day briefing. Findings in the present study supported education about practices that highlight students' safe practices. Many studies emphasized the importance of education in anchoring IPC principles and practices among nursing students.[18-20] It was evident in the literature that knowledge about many other viruses, like Zika, Ebola, and Severe Acute Respiratory Syndroem (SARS), was generally low among nursing students.[11,21] However, no assumptions could be made as limited support was present in the literature. Students received training on standard precautions during their early courses like fundamentals of nursing. But the need is still present to add new practices, which represent the new view of IPC after the COVID-19 pandemic. It is expected that further training is required for students and some trainers to ensure that proper practices are addressed and adhered to during clinical and laboratory training.

Further, training and education on IPC should be provided systematically as part of the curriculum to protect nursing students from contracting or causing infection among students, patients, HCWs, and family members. The responses of most of the trainers clustered around being selective when assigning students to ensure student and patient safety. The main concern raised by the trainers was related to students' competency in both knowledge and skills. Perhaps trainers could not endorse students' decision-making skills and clinical reasoning as the accumulative experience and knowledge are still not adequate for students to make sound decisions. Therefore, the trainers were conservative in their responses and indicated the need to have a careful selection of the units and departments where students could train.

The study limitations include involving only NE, who were involved in training students, not all educators such as those in managerial positions. In addition, nursing faculty

from the college and the preceptors were not included in this study. In addition, items investigated in this study did not go under a process of validation and were associated mainly with the current COVID-19 situation. Another limitation in the scope of the study is that it addressed only infection prevention in the clinical and laboratory setting and did not include other areas where students were gathered such as classroom and computer laboratories.

Further examination is required to confirm the study findings and set up clear rules for safe clinical training.

Conclusion

Fundings from the current study suggest that practices for both the trainer and students be revised as NE's perception of changes can lead to significant changes within the training areas, including the laboratories and the clinical settings. Our findings suggest the need to develop effective and systematic guidelines, including the strict following of IPC guidelines and precautions.

Acknowledgments

The authors would like to thank all educators and trainers for their significant contribution during the hard times of COVID-19. This study was approved by the institutional review board of the university of affiliation (03/421/2019-2020) from Jordan and from the Omani Ministry of Health (OCHS/REC/PROPSAL-APPROVED/13/2020).

Financial support and sponsorship

Nil.

Conflicts of interest

Nothing to declare.

References

1. Nabil B, Sabrina B, Abdelhakim B. Transmission route and introduction of pandemic SARS-CoV-2 between China, Italy, and Spain. J Med Virol 2021;93:564-8.
2. Peyrovi H, Yadavar-Nikravesh M, Oskouie SF, Bertero C. Iranian student nurses' experiences of clinical placement. Int Nurs Rev 2005;52:134-41.
3. Choi JS, Kim KM. Factors influencing nursing students' intention to comply with infection control practices. Am J Infect Control 2018;46:717-9.
4. Qasmi SA, Shah SMM, Wakil HYI, Pirzada S. Guiding hand hygiene interventions among future healthcare workers: Implications of knowledge, attitudes, and social influences. Am J Infect Control 2018;46:1026–31.
5. Khan HA, Baig FK, Mehboob R. Nosocomial infections: Epidemiology, prevention, control and surveillance. Asian Pac J Trop Biomed 2017;7:478–82.
6. Jones D, Martello M, Biron A, Lavoie-Tremblay M. A systematic review on the effectiveness of interventions to improve hand hygiene compliance of nurses in the hospital setting. J Nurs Sch 2017;49:143–52.
7. Labrague L, McEnroe-Petitte D, van de Mortel T, Nasirudeen A. A systematic review on hand hygiene knowledge and compliance in student nurses. Int Nurs Rev 2018;65:336–48.
8. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis power analysis program for the social, behavior, and biomedical sciences. Behav Res Methods 2007;39:175-91.
9. WHO. Transmission of SARS-CoV-2: Implications for infection prevention precautions. 2020. Available from: https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions. [Last accessed on 2020 Sep 16].
10. Hinkin J, Cutter H. How do university education and clinical experience influence pre-registration nursing students' infection control practice? A descriptive, cross-sectional survey. Nurse Educ Today 2014;34:196-201.
11. Choi JS, Kim KM. Infection-control knowledge, attitude, practice, and risk perception of occupational exposure to Zika virus among nursing students in Korea: A cross-sectional survey. J Infect Public Health 2018;11:840–4.
12. Swift A, Banks L, Baleswaran A, Cooke N, Little C, McGrath R, *et al*. COVID-19 and student nurses: A view from England. J Clin Nurs 2020;29:3111–4.
13. Chauhan, K. Knowledge attitude and practice towards infection control measures amongst medical students in a medical teaching tertiary care hospital. Int J Clin Med 2017;8:534-42.
14. Nazari R, Saberi M, Khazaie Nezhad S. Comparison of nurses and nursing students' knowledge and practice about prevention and control of nosocomial infection. Res Dev Nurs Midw 2012;9:76–83.
15. Al-Rawajfah OM, Tubaishat A. Nursing students' knowledge and practices of standard precautions: A Jordanian web-based survey. Nurse Educ Today 2015;35:1175–80.
16. Kingston LM, O'Connell NH, Dunne CP. A comparative study of hand hygiene and alcohol-based hand rub use among Irish nursing and medical students. Nurse Educ Today 2018;63:112–8.
17. Ayub A, Goyal A, Kotwal A, Kulkarni A, Kotwal A, Mahen A. Infection control practices in health care: teaching and learning requirements of medical undergraduates. Med J Armed Forces India 2013;69:107-12.
18. Hassan Z. Improving knowledge and compliance with infection control Standard Precautions among undergraduate nursing students in Jordan. Am J Infect Cont 2018;46:297-302.
19. Majidipour P, Aryan A, Janatolmakan M, Khatony A. Knowledge and performance of nursing students of Kermanshah-Iran regarding the standards of nosocomial infections control: A cross-sectional study. BMC Res Notes 2019;12:485.
20. Nofal M, Subih M, Al-Kalaldeh M, Al Hussami M. Factors influencing compliance to the infection control precautions among nurses and physicians in Jordan: A cross-sectional study. J Infect Prev 2017;18:182–8.
21. Painter Plaster AS, Tjersland DH, Jackobsen KH. Zika virus knowledge, attitudes, and vaccine interest among university students. Vaccine 2017;35:960-5.