Assessment of nursing students perceptions of their training hospital's infection prevention climate: A multi-university study in Saudi Arabia

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ABSTRACT

Background: The risk of acquiring and spreading infection must be minimized in nursing students because they are exposed to healthcare-associated infections during clinical training. To achieve this goal, students should be knowledgeable and competent in infection control practice before proceeding to their training hospitals.
Objectives: This study assessed the nursing students' perception of the infection prevention climate in training hospitals in Saudi Arabia. It also examined the predictors of the students' perceptions.
Design: A quantitative, cross-sectional design was used.
Methods: This investigation was part of a large study conducted in six Saudi universities. A total of 829 Saudi nursing students were included in this study. Data were collected using the Leading Culture of Quality in Infection Prevention scale and analyzed using descriptive and inferential statistics. Ethical approval was obtained from the King Saud University, and permission was given by the administration of each participating university.
Results: The overall perception of nursing students indicated a modest infection prevention climate. Prioritization of quality and improvement orientation was rated as the highest dimensions, whereas psychological safety and supportive environment were the lowest. The nursing students in University F had the poorest perceptions among the six universities. The predictors of nursing student perception of their training hospitals' infection prevention climates were the university where they studied, their age, and participation in infection prevention seminars.
Conclusions: This article describes nursing students' perception of the infection prevention climate of their training hospitals in Saudi Arabia. Results may provide a unique theoretical underpinning on the perception and factors that effect an infection prevention climate. Thereby, previous knowledge and literature may be expanded. Results can be used as a guide in establishing clinical policies in efforts toward improving the infection prevention climate.

1. Introduction

Recently, healthcare-associated infections (HAIs) have become one of the most common, curable, and preventable complications in healthcare settings (Ivan et al., 2017). Across the globe, infection prevention climate is a widely accepted element of patient safety and daily

practice among health care professionals (Ivan et al., 2017). As in any health profession, nurse education should promote well-equipped and competent health professional graduates in rendering quality and safety patient care (D'Alessandro et al., 2014). To diminish infection risk, nursing students should be knowledgeable and competent in infection control practice before proceeding to their training hospitals. Contemporary research has investigated and recognized the critical role played by infection prevention and its proper application in a training hospital (Colet et al., 2015; Cruz, 2018). Substantive research findings have shown that infection prevention effects positive and negative clinical experiences and student learning in clinical settings (Kim and Oh, 2015). Nursing students are capable of applying their undergraduate knowledge and skills into practice to become competent health care professionals.

However, despite nursing students' understanding of HAIs and their clinical exposure toward disease prevention and patient safety (Mitchell et al., 2014), a considerable body of evidence indicates that nursing students are constantly challenged to implement standard precautions because of their views in the infection prevention climate of their training hospitals (Cruz, 2018). Despite the rich content pertaining to predictors of standard precautions compliance, systematic evidence linking nursing students' infection prevention climate perception in their respective training hospitals is lacking. With the rapid growth of resurgent infections, especially in Saudi Arabia (Alotaibi et al., 2017), specific standards significant to infection control should be met by nursing students. To achieve this, universities and training hospitals should ascertain that their infection prevention and control education is appropriately focused.

1.1. Background of the study

HAIs have become an international problem even with the advances in the healthcare system (WHO, 2011). HAIs are among the most common diseases in hospitals with high morbidity and mortality rates (Ali et al., 2018). Khan et al. (2017) have argued that HAIs are associated with unforeseen infection advances throughout the duration of healthcare treatment; furthermore, HAIs cause notable patient disease, deaths, and prolonged hospitalization, which creates additional financial burden on patients. According to the WHO (2011), 7 out of 100 hospitalized patients developed HAIs worldwide. In the US, approximately 1.7 million infections are detected annually in hospitals, with 99,000 associated mortality (KCDCP, 2011). In Europe, approximately 7.1% patients develop HAIs, and 37,000 people die as a result (KCDCP, 2011). In one quantitative study in Saudi Arabia, 851 HAIs were reported among 5523 hospitalized patients; hospital stays amounted to 53,025 days, averaging 9 days of hospitalization (Al-Tawfiq et al., 2013). In November 2018, the country dealt with the Middle East respiratory syndrome coronavirus outbreak, which is a highly communicable and causes severe disease and result in high mortality (WHO, 2018). These infectious occurrences continue to escalate at an alarming rate and pose a risk among health care professionals and patients. Thus, prevention of infectious diseases should become a major health care professionals and patient-safety initiative.

For the past two decades, studies have reported that the application of infection control strategies, such as standard precautions in different healthcare settings, varies in different hospitals (Brosio et al., 2017; Kim and Oh, 2015; Pogorzelska-Maziarz et al., 2016). These variations could be attributed to different infection prevention climate of healthcare settings. Cruz (2018) suggested that infection prevention climate is commonly understood by health care professionals pertaining to infection prevention in clinical practice. This finding is worth noting because in a descriptive study by Castro-Sánchez and Holmes (2015), the infection prevention climate differences were due to standard precautions protocol, technical procedures, human resources, infection surveillance, and standard precautions compliance assessment. The variation could result in different geographical areas, healthcare

facilities, and individual providers (Colet et al., 2018). With the increasing prevalence of HAIs across the globe (WHO, 2011), infection prevention climate variation most likely affects patient-care quality. Nevertheless, describing this variation could support the implementation of interventions in decreasing HAIs, where this is most needed.

Similar to nurses, nursing students are also exposed to healthcare facilities through their clinical training (Cruz, 2018). Colet et al. (2015) indicated that nursing students are involved during inpatient care in their clinical training, and they are not exempted in HAI threats (Colet et al., 2015). Thus, future nurses should be prepared, and they must have a good understanding of operating and maintaining effective infection control programs in healthcare settings.

Although some studies highlight the significance of standard precautions training and education in various nursing schools, controversy surrounds the nursing students' perception of infection prevention climate in training hospitals (Cruz, 2018). Notably, although some findings highlighted the significance of sustaining high-quality infection prevention climate (Cruz and Bashtawi, 2016), they have different views in terms of the infection prevention climate influence in training hospitals (Cruz, 2018; D'Alessandro et al., 2014). Although some studies showed that infection prevention was cautiously practiced by health care professionals in Saudi Arabia (Colet et al., 2018), training hospitals' infection prevention climate among nursing students is not well described. Therefore, instituting a baseline understanding of nursing students' infection prevention climate perception in their respective training hospitals is important.

1.2. Aims

This study assessed the nursing students' perception of the infection prevention climate in training hospitals in Saudi Arabia. It also examined the predictors of the students' perceptions.

2. Methods

This study was part of a large quantitative, cross-sectional study investigating the Saudi nursing students' standard precautions compliance, patient safety competence, and perceptions of their training hospitals' infection prevention climate. This article reports on the students' perceptions of their training hospitals' infection prevention climate. Separate reports were published on students' standard precautions compliance (Alshammari et al., 2018) and nursing students' patient safety competence (Alquwez et al., 2019).

The settings and the samples were fully described in Alshammari et al. (2018) and Alquwez et al. (2019). The study was conducted in six state universities in Saudi Arabia. One university (A) is in the North region of the Kingdom, while two (B and C) and three (D, E, and F) universities are situated in the Center and West of the country, respectively. The BSN in the six universities is a 4-year program with an additional year of intensive internship program. The amount of clinical experience of students in the third and fourth year of the BSN of each university varies: University A (third year = 540 h, fourth year = 360 h), University B (third year = 360 h, fourth year = 480 h), University C (third year = 240 h, fourth year = 360 h), University D (third year = 360 h, fourth year = 540 h), University E (third year = 300 h, fourth year = 240 h), and University F (third year = 210 h, fourth year = 195 h). The common clinical courses in the third year are Adult Health Nursing 1 and 2, Maternal Health Nursing, Pediatric Health Nursing, and Mental Health Nursing. For the fourth year, the common clinical courses are Nursing Leadership and Management, Emergency Nursing, and Critical Care Nursing. During the one-year internship, all the universities require their students to attend 40 h per week of clinical duty in their university hospitals. The common courses in the BSN program of the six universities where concepts of infection prevention and control are integrated are Fundamentals of Nursing (theory and practice), Adult Health Nursing 1 and 2 (theory

Table 1

Item means, subscales means, and overall culture of infection prevention (n = 829).

Variable	Mean	SD
Psychological safety	3.24	0.78
1. The climate in the organization promotes the free exchange of ideas.	2.91	1.25
2. Staff will freely speak up if they see something that may improve patient care or affect patient safety.	3.26	1.15
3. I feel free to express my opinion without worrying about the outcome.	3.05	1.14
4. In general, people in our organization treat each other with respect.	3.43	1.10
5. People in this organization are comfortable checking with each other if they have questions about the right way to do something.	3.41	1.07
6. The people in this organization value others' unique skills and talents.	3.31	1.07
7. Members of this organization are able to bring up problems and tough issues.	3.30	1.091
Prioritization of quality	3.42	0.82
8. The health care–associated infection prevention goals and strategic plan of our organization are clear and well communicated.	3.40	1.13
9. Results of our infection prevention efforts are measured and communicated regularly to staff.	3.34	1.20
10. There is a good information flow among departments to provide high-quality patient safety and care.	3.38	1.10
11. People here, feel a sense of urgency about preventing health care–associated infections.	3.57	1.16
12. Employees are encouraged to become involved in infection prevention.	3.41	1.10
Supportive work environment	3.24	0.58
13. Senior leadership here has created an environment that enables changes to be made.	3.43	1.10
14. Where I work, people are held accountable for the results of their work.	3.53	1.11
15. The quality of work suffers because of the amount of work staff are expected to do.	3.38	1.08
16. Most people in this organization are so busy that they have very little time to devote to infection prevention efforts.[a]	2.64	1.09
Improvement orientation	3.42	0.90
17. I can think of examples when problems with patient infections have universe led to changes in our procedures or equipment.	3.32	1.22
18. I know of one or more health care–associated infection prevention initiatives going on within our organization this year.	3.42	1.10
19. I have a clear understanding of the organization's mission, vision, and values.	3.52	1.15
Overall mean	3.32	0.62

[a] Reverse scored item.

and practice), and Community Health Nursing (theory and practice).

A convenience sample of 829 nursing students studying in 6 Saudi universities was surveyed in the study. The students were included in the study if they were Saudi nationals registered full-time in the 3rd and 4th years of the BSN of the six universities and if they had or having their clinical duties in an identified hospital for each university. Nursing interns were also included. The response rate in the study was 77.3% (N = 1191). The largest sample was from University A (n = 254), followed by University F (n = 154), B (n = 144), C (n = 120), and D (n = 94). The lowest was from University E (n = 63). The majority of the respondents was females (69.5%, n = 576) who did not attend any infection prevention and control seminars in the past six months (67.9%, n = 563). More students were in the third year (n = 302) than 282 and 245 students in the 4th and internship years, respectively (Alquwez et al., 2019; Alshammari et al., 2018).

2.1. Instrument

The Leading Culture of Quality in Infection Prevention (LCQ-IP) was utilized to gather information on the students' views of their training hospitals' infection prevention climate (Pogorzelska-Maziarz et al., 2016). The tool was designed to measure a hospital's culture for quality associated with infection prevention. It has 19 items and is responded using a 5-point Likert Scale (1 = strongly disagree to 5 = strongly agree). The LCQ-IP has four dimensions, which are central to infection prevention framework. These four dimensions are "psychological safety (7 items), quality prioritization (5 items), supportive work environment (4 items), and improvement orientation (3 items)". Scores are obtained by computing the dimension means and overall scale mean. Item 16 is negatively worded; hence, its score is reversed before further analysis. The four factors have Cronbach's alpha from 0.724 to 0.883, whereas the entire scale has a Cronbach alpha of 0.926 (Pogorzelska-Maziarz et al., 2016). The Arabic version of the tool was used in the present study (Cruz, 2018). Cruz (2018) reported the psychometric properties of the Arabic version of the tool among Saudi nursing students. The exploratory factor analysis of the Arabic version of the tool supported the four dimensions of the scale, which supported its construct validity. The Arabic version also exhibited good internal consistency reliability, with Cronbach's alpha of 0.89.

For the demographic variables of the respondents, age, gender, year of study, and attendance to infection prevention and control seminars in the past 6 months (yes/no) were collected.

2.2. Ethical consideration and data collection

The main study protocol was reviewed by the IRB of the College of Medicine of King Saud University (Project No.: E-17-2559). The study was also permitted by the administration of each participating university. Information about the study, including its importance, participation benefits, participation risk, and voluntary participation were provided before the students were asked to sign an informed consent form. The respondents were also given time to ask questions about the study. Third and fourth-year students were handed with the questionnaire in their classrooms, 15–20 min after their lectures. Their lecturers were asked to leave the classroom to avoid potential undue influence bias. For the nursing interns, the questionnaires were distributed during their breaks in the hospital. The researchers approached them and explained the same information to them. The interns who agreed to participate were asked to sign an inform consent and were given the questionnaire. The same time was given to them to answer the questionnaire.

2.3. Statistical analysis

Means and standard deviations were computed for the LCQ-IP individual items, dimensions, and overall score. t-tests, Pearson correlations, and one-way ANOVA with Tukey HSD test as post hoc were performed to test the association between the nursing students' characteristics and their perceived infection prevention climate of training hospitals. A standard multiple linear regression was conducted to identify significant demographic predictors of the nursing students' perceptions. $p < .05$ was considered significant. The 95% confidence intervals were also calculated. All analyses were carried out using the SPSS version 22.0.

3. Results

The overall LCQ-IP mean was 3.32 (SD = 0.62), indicating a modest

Table 2
Association between perceived culture of infection prevention and demographic characteristics (n = 829).

Variable	Mean	SD	Statistical test	p
University[a]				
University A	3.37	0.72	$F = 13.63$	< 0.001***
University B	3.49	0.21		
University C	3.46	0.50		
University D	3.32	0.58		
University E	3.23	0.59		
University F	2.99	0.67		
Age			$r = -0.09$	0.014*
Gender				
Female	3.28	0.61	$t = -2.82$	0.005**
Male	3.41	0.62		
Year level				
Third year	3.33	0.64	$F = 0.84$	0.432
Fourth year	3.34	0.63		
Internship year	3.27	0.56		
Attendance to infection prevention and control training in the last 6 months				
No	3.23	0.60	$t = -5.68$	< 0.001***
Yes	3.49	0.61		

Note.
[a] University F versus University A ($p < .001$), University B ($p < .001$), University C ($p < .001$), and University D ($p < .001$).
  * Significant at 0.05 level.
  ** Significant at 0.01 level.
  *** Significant at 0.001 level.

Table 3
Demographic predictors of nursing students' perceptions of culture of infection prevention of training hospitals (n = 829).

Predictor variables	ß	SE-b	Beta	t	p	95% CI Upper	95% CI Lower
University (reference group: University F)							
University A	0.41	0.07	0.31	5.87	< 0.001***	0.27	0.55
University B	0.44	0.07	0.27	5.99	< 0.001***	0.30	0.59
University C	0.38	0.08	0.22	5.00	< 0.001***	0.23	0.52
University D	0.30	0.08	0.15	3.88	< 0.001***	0.15	0.45
University E	0.22	0.09	0.09	2.36	0.018*	0.04	0.40
Age	−0.03	0.01	−0.14	−3.55	< 0.001***	−0.05	−0.01
Gender	0.05	0.06	0.04	0.95	0.345	−0.06	0.16
Year level (reference group: internship year)							
Third year	0.09	0.06	0.07	1.55	0.121	−0.02	0.20
Fourth year	0.11	0.05	0.08	1.95	0.051	0.00	0.21
Attendance to infection prevention and control training in the last 6 months	0.23	0.05	0.18	4.83	< 0.001***	0.14	0.33

Note. Perceived infection prevention climate of training hospitals was the dependent variable. ß is the unstandardized coefficients; SE-b is the Standard error.
$R^2 = 0.122$; Adjusted $R^2 = 0.111$.
  * Significant at 0.05 level.
  *** Significant at 0.001 level.

perception of the training hospitals' infection prevention climate. Prioritization of quality (M = 3.42, SD = 0.82) and improvement orientation (M = 3.42, SD = 0.90) received the highest infection prevention climate factor means, whereas psychological safety (M = 3.24, SD = 0.78) and supportive environment (M = 3.24, SD = 0.58) received the lowest. The four dimensions were at the modest level as perceived by respondents (see Table 1).

Table 2 reveals the relationship between the respondents' demographic characteristics and the perceptions of infection prevention climate of the training hospitals. A significant difference existed in the nursing students' perceptions between universities ($F = 13.63$, $p < .001$). The Tukey HSD tests revealed that students in University F (M = 2.99, SD = 0.67) had the poorest perceptions of their training hospital's infection prevention climate among University A (M = 3.37, SD = 0.72, $p < .001$), University B (M = 3.49, SD = 0.21, $p < .001$), University C (M = 3.46, SD = 0.50, $p < .001$), and University D (M = 3.32, SD = 0.58, $p < .001$). Male students (M = 3.41, SD = 0.62) had a more positive perceptions than that of females (M = 3.28, SD = 0.61, $t = -2.82$, $p = .005$). Students who attended seminars on infection prevention in the past six months (M = 3.49, SD = 0.61) reported a more positive perceptions of their training hospitals' infection prevention climate than those who did not (M = 3.23, SD = 0.60, $t = -5.68$, $p < .001$).

The demographic characteristics that predict the respondents' perceptions of their training hospitals' infection prevention climate were identified. A standard multiple regression analysis was conducted whose results are indicated in Table 3. The model was significant ($F[10, 818] = 11.39$, $p < .001$), explaining approximately 11.1% variance in the students' perceptions ($R^2 = 0.122$; adjusted $R^2 = 0.111$). University, age, and attendance to infection prevention seminars in the past six months were significant demographic predictors of students' infection prevention climate perceptions. Respondents from University F had a lower overall mean score in the LCQ-IP by 0.41 ($p < .001$, 95% CI = 0.27, 0.55), 0.44 ($p < .001$, 95% CI = 0.30, 0.59), 0.38 ($p < .001$, 95% CI = 0.23, 0.52), 0.30 ($p < .001$, 95% CI = 0.15, 0.45), and 0.22 ($p = .018$, 95% CI = 0.04, 0.40) than those from University A, B, C, D, and E, respectively. A one-year increase in the

students' age decreased the overall mean by 0.03 ($p < .001$, 95% CI = −0.05, −0.01). Respondents who attended infection prevention seminars in the past six months had higher perception score by 0.23 ($p < .001$, 95% CI = 0.14, 0.33) than students who did not attend.

4. Discussion

This study assessed the nursing students' perception of training hospital infection prevention climate in Saudi Arabia. It also examined the respondents' perception predictors of infection prevention climate. Five major points were highlighted in this study.

First, the findings highlighted the students' infection prevention climate. The results revealed that nursing students have attained a relatively modest level of perspective on training hospitals' infection prevention climate (M = 3.32, SD = 0.62). This result was in accordance with a study conducted in China (Liu et al., 2014), Ethiopia (Wami et al., 2016), and India (Sodhi et al., 2013). However, this result was lower than that conducted among nurses in Saudi Arabia (M = 3.86, SD = 0.51) (Colet et al., 2018). This finding may be because training hospitals are a complex learning environment for nursing students, and each hospital may have different infection prevention and control policies. Thus, students might be unaware of the infection prevention and control protocol. Baraz et al. (2015) indicated that training hospitals are unpredictable, stressful, and constantly changing. Thus, such conditions may add confusion, and nursing students may be unable to handle the concepts of infection prevention and control at the required and defined time. Students most likely viewed that infection control is beyond their responsibilities. They might have thought that infection control is a responsibility of the staff nurses. However, this assumption requires further investigation.

The infection prevention climate dimensions "Prioritization of Quality" and "Improvement Orientation" received the highest dimensions. This statement implied a clear understanding of infection prevention climate in the organization. This result is consistent with the previous study of Colet et al. (2017), wherein nursing students have a great understanding and adherence regarding training hospitals'

policies in providing quality patient safety and care. Mosadeghrad (2014) suggested that training hospitals improve clinical skills and positively impact the overall quality of care among health care professionals. Nursing students, as a training hospital beneficiary, have increased learning opportunities, and are also capable of identifying the influencing factors of their training hospitals' infection prevention climate.

The "psychological safety" and "supportive environment" dimensions were the lowest. This result is worth noting because psychological safety and a supportive environment are intertwined with hospital organizational characteristics. This finding also suggests that efforts to improve equipment management, training and supervision, and interdisciplinary communications are imperative. In a descriptive study by Livshiz-Riven et al. (2014), poor psychological safety means greater medical errors in the treatment of patients. Cruz and Bashtawi (2016) found that inadequate supportive environment on infection control and environment-related problems are among the crucial issues that need urgent attention. Hence, improving the training hospitals' infection prevention climate is suggested, especially in promoting a supportive work environment and psychological safety, which were ranked as the lowest among the four infection prevention climate dimensions.

Second, the respondents' university has a significant association and influence on the nursing students' perception toward training hospital's infection prevention climate. The present study suggests that each university and its affiliated training hospital may have different infection prevention and control curricular content. Different curricula mean different teaching approaches and different clinical experience, which may effect students' perceptions (Bowser et al., 2017). Furthermore, the BSN programs of the 6 universities have varying amount of time for clinical experience of the students. This might have also effected the different perceptions among the students from different universities. Baraz et al. (2015) found that clinical learning in a training hospital takes place in a complex social context of the clinical environment. Given the complexities, it may be implied that the hospital wherein each nursing student was trained may have different infection prevention and control protocol and policies. Hence, the respondents may have different degrees of awareness and practices of infection prevention and control. Cruz (2018) stated that the quality of clinical training given on nursing students is the most important factor that influences their infection and prevention and control learning. However, this finding should be interpreted with caution because the factors that influence students' infection prevention and control learning were not discussed. Establishing the competence and confidence of students is an essential factor of infection prevention and control success, and clinical educators should facilitate the process.

Third, nursing students age is significantly related to their infection prevention climate perception. The older the respondents are, the better their infection prevention climate perception. A previous study found that as an individual grows older, the more he or she acquires knowledge and motor learning (Sharma et al., 2016). The results are also in accordance with the empirical study conducted in China (Cheung et al., 2015). Adults might better understand the significant health risk and are more satisfied with their clinical experience than the younger ones (Rolison et al., 2014). Age likely imparts experience, and that they can perform accurately. The older the individual, the greater learning opportunities they have, which are may be appropriate to infection prevention and control study concepts. As such, they have an increased confidence level in terms of infection prevention and control practice. The effects of age toward infection prevention climate prections were not validated in the study. A deep understanding of the relationship between the students' age and infection prevention climate may improve their adherence to appropriate infection prevention and control practice.

Fourth, males have a better perception of infection prevention climate than females. This result is consistent with those who found that males exhibited better compliance with infection prevention and control than females (Cruz, 2018; Cruz and Bashtawi, 2016). However, this result negates that of another study, which reported that female nursing students have a more favourable infection prevention climate perception than males (Colet et al., 2015). Extrapolated data from study of Wilhemsson et al. (2011) showed that females demonstrated greater confidence in their abilities than males. Females are used to work in groups, whereas males often work alone. Working in groups could help identify an individual's strengths and weaknesses, exhibiting great productivity. Thus, they are confident in their potential partners' skills. The research gap regarding gender complexity warrants further exploration.

Another highlight of the study is that infection prevention and control seminars/training was associated to and influenced nursing students' perceptions of infection prevention climate in training hospitals. Respondents who participated in seminars on infection prevention in the last six months had better perceptions of infection prevention climate in their training hospitals than those who did not. This finding supports the work of other researchers that reported that the more nurses attended a workshop, the higher their motivation to practice infection control (Cruz, 2018; Cruz and Bashtawi, 2016). A study conducted in one tertiary care hospital in Saudi Arabia found that consistent training and workshop contributed to HAI reduction (Al Kuwaiti, 2017). A systematic review of HAI prevention among 92 studies from 1996 to 2012 found that some of the components in successful infection prevention and control implementation are education, training, and positive organizational culture (Zingg et al., 2015). All studies in the review showed improvement in central-line-associated bloodstream infections after the education/training sessions. Training/workshop may improve an individual's knowledge, skills, and may impart a good understanding of the nurses' responsibilities. Hence, this study underscores the importance of integrating seminars/training on infection prevention and control for nursing students.

4.1. Limitations

Limitations must be considered when the findings are evaluated. The study used a cross-sectional design, which could not distinguish other issues that might affect nursing students' perception toward infection prevention climate. Longitudinal studies may provide definite information about the causal inference. Moreover, the study did not explore the frequency of attendance of nursing students on infection prevention and control seminars in the last 6 months and the inclusion of curricular content on infection prevention and control. Future studies should explore these variables. Nevertheless, the researchers strongly believe that the above limitations have not undermined the study purpose.

One of the strengths of the study is its large sample size and inclusion of six universities, which could help in generalizing the findings. The tools used in this study exhibited good psychometric properties and high response rate. The present findings contributed to the limited literature on infection prevention climate of training hospitals as perceived by nursing students.

5. Conclusion

This study examined the nursing students' perception on infection prevention climate of their training hospitals in Saudi Arabia. The students have attained a relatively modest level of perspective on training hospitals' infection prevention climate. Further, university, age, and participation to infection prevention in the past six months predicted nursing students' perception of infection prevention climate. Gender was significantly related to infection prevention climate perception. Finally, the results provided a unique theoretical underpinning that expanded on previous knowledge and literature on factors that affect infection prevention climate.

5.1. Implications of the study

Nursing students are expected to be highly involved in the real world of the clinical practice setting. They are not exempted in the HAI threats. This investigation critically examines the view of nursing students toward infection prevention climate in their training hospital.

The findings can be used as a guide in establishing clinical policies in efforts toward training hospitals' infection prevention climate improvement. The finding can help nursing students to become competent and confident future healthcare professionals. Overall, the nursing students' infection prevention climate perspective needs further improvement, especially in terms of psychological safety and supportive work environment dimensions. Hence, organizing training and supervision and using supportive working condition strategies is necessary to make nursing students feel safe, creative, and engaged toward infection prevention and control implementation. Creating and defining nursing student's engagement rules should be done so that they can be comfortable, engage deeply, and communicate clearly to other health care professionals. In this regard, nursing students may feel included, important, and part of the healthcare team. A supportive working environment and high engagement can increase the students' motivation to tackle issues pertaining to infection prevention climate, development opportunities, and good performance. Facilitating meaningful connections between nursing students from various universities and their perceived infection prevention climate may improve through a comprehensive and unified course syllabus and supporting program that can empower students' learning. Given the positive relationship between participation in infection prevention seminar and infection prevention climate perceptions, increasing the number of training facilities that can provide a variety of training, workshop, and seminar programs to nursing students related to infection prevention is important.

Funding sources

Ethical approval

Declaration of Competing Interest

None declared.

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