

Research Article

Perceptions of Residents on the Microlearning Environment in Postgraduate Clinical Training

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Background. Teaching hospitals are the primary locus of training for residents, and the afforded microlearning environments can affect their level of satisfaction, competence, and learning processes. Since limited attention has been directed towards evaluating the microlearning environment, how Saudi postgraduate residents perceive it remains unknown. **Objectives.** This study evaluated the microlearning environments for major clinical specialties in a tertiary care teaching hospital. It also investigated the association between satisfaction levels and the age and gender of the participants, as well as their stage and specialty. **Methods and Methods.** A questionnaire-based, observational study was conducted using a prevalidated HEMLEM tool for data collection. Data were collected using the QuestionPro® survey tool and analyzed using SPSS version 23 software. A one-way ANOVA and *t*-test were performed to compare different subgroups. **Results.** In total, 129 residents participated in the study, representing a response rate of 87.16%. The overall mean value for microlearning environment satisfaction was 50.21. Females scored higher relative to males. Maximum satisfaction with the microlearning environment was observed in the age group 25–30 years and among internal medicine residents. **Conclusion.** Overall, a satisfactory score on the HEMLEM tool was recorded, suggesting the majority of residents are satisfied with the microlearning environment at KFHU. Supervisors, program directors, and curriculum planners could use our findings to further improve the educational climates within their training specialties.

1. Introduction

Teaching hospitals provide the most significant hands-on learning platform to postgraduate residents. Since hospitals are the primary centers for learning, many of the residents' professional development occurs during their clinical placements. Therefore, the learning environment offered by training programs is a critical determinant of residents' level of satisfaction, behavior, academic achievement, and overall outcomes [1]. A positive learning environment able to nurture residents' personal and professional development ensures greater satisfaction, fewer medical errors, and improved patient care. In contrast, a negative learning environment is not only detrimental to the residents' professional growth but can also serve as an obstacle to

teamwork, the development of interpersonal relationships, and effective provision of healthcare services [2].

The learning environment of clinical training programs is a manifestation of how residents experience the taught curriculum [3]. The learning environment is understood as the climate that informs what it means to be a learner within an organization [4, 5]. The learning environment offered by training programs is a complex, multifactorial, and dynamic entity as it is influenced by individual, interpersonal, and organizational factors [4, 6, 7]. Considering the complexity of the learning environment, Isba defined it as “a combination of several small and dynamic microenvironments that learners experience during training” [8].

In the context of clinical training, two important factors affecting residents' learning and development are the

attitudes and behaviors of staff towards residents and the quality of teaching offered during training [7]. Both these factors are person-specific and are associated with the support that residents receive from the staff, peers, seniors, and supervisors. The first factor (staff attitudes and behaviors) refers to the welcoming and friendly atmosphere offered by staff to the residents so that they feel valued and settled in their training. The support offered by their peers in the workplace is critical for residents' competence development and psychological wellbeing [9]. Brown et al. suggests that a lack of support from colleagues, especially during times of uncertainty, can cause residents to lose confidence and motivation and can even cause burnout [10]. In the case of teaching quality, clinical teachers are primarily responsible for creating a safe and nurturing learning environment by integrating role modeling, scaffolded guidance, and constructive feedback in their teaching practices [11–13].

The significance of the learning environment is evident from the plethora of studies that have tried to assess it in different educational contexts [14]. However, previous studies have focused principally on measuring the overall educational environment at the institutional level, tending to ignore important microfactors, such as staff attitudes and teaching quality [7]. Moreover, the perceptions of postgraduate residents in Saudi Arabia with regard to the microlearning environment are only vaguely understood. Due to the limited focus in educational literature on the perceptions of Saudi residents, our understanding of the microlearning environment in postgraduate training programs is underdeveloped [15]. To the best of our knowledge, no study has been conducted to date exploring and comparing how the microlearning environment is perceived by Saudi residents of different clinical specialties. Consequently, it is unknown how Saudi residents perceive staff attitudes and teaching quality during their training. Therefore, this study aims to measure the perceptions of postgraduate residents in relation to the microlearning environment at a tertiary care teaching hospital. The findings of this study will potentially reflect upon the effectiveness of the implemented training curriculum and the provided learning climate. Additionally, the findings could help program developers and supervisors to introspect the training programs and tailor them where necessary.

2. Materials and Methods

2.1. Study Settings and Participants. This questionnaire-based, descriptive cross-sectional study was conducted at King Fahd University Hospital (KFHU) from October 2020 to March 2021. The participants were recruited from postgraduate training programs of four major clinical specialties (internal medicine, pediatrics, surgery, and obstetrics and gynecology). All the residents from all training years working in these four major specialties at KFHU were included. Postgraduate residents from other minor specialties, medical interns, and undergraduate students were excluded from the study.

2.2. HEMLEM Tool. Multiple tools exist in the literature that can assist in measuring the learning environment. However, these instruments are fairly lengthy, and their time-consuming nature discourages learners from accurately responding to key items. Moreover, these tools do not focus on specific microlearning environments and are fairly generic in design. After a comprehensive literature review, we selected and used a prevalidated tool, Healthcare Education Micro Learning Environment Measure (HEMLEM), for the purpose of data collection. The HEMLEM tool is a short and pertinent tool designed to measure small and dynamic microlearning environments, such as those experienced by residents on clinical placement [7].

The HEMLEM tool has 12 items in total, which have been classified into two subscales. These are (1) staff attitudes and behaviors (items 1–6) and (2) teaching quality (items 7–12). The staff attitudes and behaviors section explores the opinions of residents concerning the support provided by staff during their training. The teaching quality section focuses on the quality of knowledge and experience provided to residents through various teaching activities.

2.3. Data Collection. An online survey was designed using QuestionPro® based on the HEMLEM tool. A 5-point Likert scale (strongly agree = 5, agree = 4, not sure = 3, disagree = 2, and strongly disagree = 1) was used, and the participants were asked to rate 12 items. The overall HEMLEM score thus ranges between 12 and 60. Since all 12 items of the HEMLEM tool are positively worded, an overall mean score greater than 36 was considered as a positive satisfaction with the learning environment. Therefore, the higher the number, the higher the level of the residents' satisfaction with their learning environment. Additionally, demographic data were obtained to measure any association between the learning environment and gender, training year, specialty, and/or age of the resident. After designing the online questionnaire, a survey was distributed among the target participants using an active link and a quick response (QR) code.

2.4. Data Analysis. Descriptive statistics such as frequencies, percentages, and mean and standard deviations were calculated for each quantitative variable. Frequencies and percentages were calculated for categorical variables, whereas means and standard deviations were calculated for continuous variables. The comparison between HEMLEM score and gender was explored using an independent *t*-test. Comparisons between HEMLEM score and age, training year, and specialty were calculated using one-way ANOVA. A value of 0.05 or less was considered statistically significant. All the statistical analyses were performed using SPSS version 23.

2.5. Ethical Considerations. All the participants were informed of the purpose of the study before their participation was requested. Moreover, permission was sought to anonymously report the findings, by incorporating an electronic consent in the survey link. Ethical approval for the study was obtained from the Institutional Review Board of Imam

Abdulrahman Bin Faisal University under reference # IRB-UGS-2020-01-346.

3. Results

In total, 129 residents participated in our study representing a response rate of 87.16%. Of these 129 residents, 48 (37.20%) were males and 81 (62.80%) were females. In terms of age groups, 50 (38.80%) were younger than 25 years of age, 52 (40.30%) were between 25 and 30, and the remaining 27 (20.90%) aged from 30 to 35. 40 (31%) residents were in their first year of training; 27 (20.90%), in their second year; 10 (7.80%), in their third year of training; 37 (28.70%), in their fourth year; and the remaining 15 (11.60%), in their fifth year. The majority of the participants were from internal medicine (33.30%), followed by surgery (31.80%), obstetrics and gynecology (17.80%), and pediatrics (17.10%).

The overall mean score was 50.21, which represents a high level of residents' satisfaction with the provided microlearning environment. Although the differences were statistically insignificant, female residents scored slightly higher (50.42 ± 7.87) than males (50.03 ± 8.06), and maximum satisfaction with the microlearning environment was recorded in the age group of 25–30 years (51.48 ± 8.06). With respect to the training year, fifth year residents showed maximum (52.80 ± 8.74) and fourth year residents showed minimum levels of satisfaction (48.67 ± 6.90). Although statistically insignificant, the maximum satisfaction level was observed in residents from internal medicine (52.60 ± 8.55), followed by general surgery (49.51 ± 8.43), pediatrics (48.35 ± 6.33), and obstetrics and gynecology (46.95 ± 6.28). Table 1 provides variable-wise details through frequencies and percentages and achieved HEMLEM scores through means and standard deviations.

Table 2 shows the overall and genderwise score comparisons for each item, subscale and full scale. Although statistically insignificant, females perceived staff attitudes and behaviors to be slightly more positive (24.59 ± 4.93) than males (24.15 ± 4.93). With only a minimal difference, males ranked the teaching quality of the training program higher (25.88 ± 4.01) than females (25.83 ± 3.92). In the itemwise comparison, the female residents scored significantly higher (4.64 ± 0.72) than males (4.33 ± 0.91) and reported that they were confident that the placement had improved their knowledge and skills ($p < 0.05$).

While comparing the level of satisfaction regarding staff attitudes and behaviors and teaching quality, residents from the internal medicine specialty perceived the learning atmosphere as significantly open, welcoming, and more friendly than other specialties ($p < 0.05$). Similarly, the residents for internal medicine, among all the specialties, reported maximum satisfaction with teaching quality. However, the difference was statistically insignificant. Table 3 provides specialty-wise scores on HEMLEM subscales.

4. Discussion

This study explored the perceptions of postgraduate residents regarding the microlearning environment offered to them in four major clinical specialties. The participants

showed a high level of satisfaction with both microlearning environments (staff attitudes towards residents and teaching quality). In contrast to the findings from the previous study at KFHU [16], the female participants reported greater satisfaction with their clinical placements than males. A possible explanation for this finding could be the special care or lenience received by female residents during training [17]. Irrespective of the factors precipitating this finding, it can be assumed that unlike other teaching contexts where females are frequent victims of prejudice and mistreatment [18], female residents at KFHU experience a safe and professional learning environment. An interesting finding is that residents aged from 25 to 30, who formed the largest cohort, held a more positive attitude towards their learning environment when compared to the other two age groups. A majority of medical students in Saudi Arabia graduate around the age of 24 and then pursue postgraduate training immediately thereafter, which is probably why most respondents were included in the age bracket 25–30. Since we did not investigate the reasons that underpin higher satisfaction levels in the 25–30 age group, it would be difficult to explain why these residents reported higher satisfaction than other two groups. A follow-up study targeting this age group could explore possible factors that might have contributed to this finding. We also discovered that fifth year residents had the most positive perceptions of their learning climate, which could be attributed to their seniority. Senior residents are known to regulate their learning more effectively and with greater responsibility than junior residents who rely upon others for their learning [19]. Additionally, senior residents are relatively more autonomous and independent practitioners than junior residents, which could lead to higher confidence, self-sufficiency, and inflated beliefs among senior residents towards their learning environment [20]. Interestingly, the second highest level of satisfaction was observed in first year residents. Flaherty et al. reviewed that newly inducted junior residents tend to report higher satisfaction levels as compared to their seniors due to lesser expectations from training programs and increased pressure of social desirability [2].

Our findings suggested a significant association between specialties and staff attitudes and behavior (Table 3). Of all the major training programs, residents from internal medicine found their learning environment to be the most welcoming and friendly. This is interesting because internal medicine residents also observed that their clinical placement effectively assisted them in translating theory into practice. Based on these findings, it can be hypothesized that an open and welcoming clinical learning environment enables students to apply their newly acquired knowledge and skills in practice, which is the ultimate goal of the learning process.

In our study, the obstetrics and gynecology residents reported the least positive perceptions of their clinical placement. Multiple factors could explain this relatively low score. In obstetrics and gynecology practice, there is relatively less cushion for medical error, and a minor misjudgment can cost the life of the patient and/or the fetus

TABLE 1: Demographic characteristics of the participants and HEMLEM scores achieved.

Variables	Participants		HEMLEM score Mean \pm SD	<i>p</i> value
	Frequency	Percentage (%)		
<i>Gender</i>				
Males	48	37.20	50.03 \pm 8.06	0.75
Females	81	62.80	50.42 \pm 7.87	
<i>Age</i>				
Below 25	50	38.80	48.66 \pm 7.90	0.18
25–30	52	40.30	51.48 \pm 8.06	
30–35	27	20.90	49.81 \pm 7.41	
<i>Training Year</i>				
First	40	31	51.02 \pm 7.64	0.240
Second	27	20.90	48.07 \pm 9.17	
Third	10	7.80	49.80 \pm 6.89	
Fourth	37	28.70	48.67 \pm 6.90	
Fifth	15	11.60	52.80 \pm 8.74	
<i>Training Specialty</i>				
Internal medicine	43	33.30	52.60 \pm 8.55	0.096
Surgery	41	31.80	49.51 \pm 8.43	
Pediatrics	23	17.80	48.35 \pm 6.33	
Gynecology	22	17.10	46.95 \pm 6.28	

TABLE 2: Genderwise and overall scores on the HEMLEM tool.

Items	Male	Female	Overall	<i>p</i> value
	Mean \pm SD	Mean \pm SD	Mean \pm SD	
(1) This placement had a welcoming, friendly, and open atmosphere	4.06 \pm 1.22	4.23 \pm 1.01	4.17 \pm 1.09	0.41
(2) There was a culture where I felt free to ask questions or make comments on this placement	4.17 \pm 0.93	4.12 \pm 1.14	4.13 \pm 1.04	0.75
(3) Staff on this placement were enthusiastic about teaching	3.92 \pm 1.05	4.14 \pm 0.94	4.06 \pm 0.98	0.21
(4) My supervisor showed an interest in me	3.92 \pm 1.25	4.18 \pm 1.12	4.08 \pm 1.16	0.22
(5) My input was valued on this placement	4.17 \pm 0.95	4.01 \pm 1.05	4.10 \pm 1.01	0.39
(6) I was provided with regular, useful, and supportive feedback during this placement	3.85 \pm 0.98	3.93 \pm 0.97	3.91 \pm 0.97	0.66
(7) I had the opportunity to apply my previous knowledge in this placement	4.29 \pm 1.03	4.43 \pm 0.7	4.38 \pm 0.84	0.38
(8) My knowledge and skills were developed on this placement	4.33 \pm 0.91	4.64 \pm 0.72	4.54 \pm 0.8	0.04*
(9) This placement helped me put theory into practice	4.31 \pm 0.82	4.22 \pm 0.98	4.27 \pm 0.92	0.57
(10) I was able to meet my learning objectives on this placement	4.17 \pm 1.09	3.94 \pm 0.94	3.85 \pm 0.99	0.38
(11) I had the opportunity to deal with the patient as a whole on this placement	4.67 \pm 0.78	4.48 \pm 1.01	4.59 \pm 0.92	0.32
(12) I was given tasks suitable for my stage of training on this placement	4.17 \pm 1.02	4.10 \pm 1.06	4.14 \pm 1.04	0.75
Subscale 1: staff attitudes and behaviors	24.15 \pm 4.93	24.59 \pm 4.93	24.38 \pm 4.92	0.57
Subscale 2: teaching quality	25.88 \pm 4.01	25.83 \pm 3.92	25.83 \pm 3.94	0.95
Overall HEMLEM score	50.03 \pm 8.06	50.42 \pm 7.87	50.21 \pm 7.91	0.75

[21, 22]. Moreover, these patients visiting obstetrics and gynecology are known to be more sensitive about residents being involved in their clinical care [23]. Thus, it is hypothesized that the sensitive nature of clinical practice in obstetrics and gynecology might offer a less welcoming environment to residents when compared to other specialties. While exploring the hospital learning environment in the eastern region, Lombarts and colleagues found increased workload, racism, blame culture, and sexual discrimination to be prominent factors in the low scores received by residents [15]. Some other reasons highlighted in other studies included unclear or implicit training outcomes, miscommunication, and passive neglect of residents' learning due to patient overload [24, 25]. Since we did not aim to explore potential reasons for high and/or low resident satisfaction levels, this area remains a gap to be resolved in future research. Moreover, a longitudinal study using the

HEMLEM tool could be conducted to observe the changes in the satisfaction level of postgraduate residents, so that the learning environment can be improved, and better training outcomes are achieved.

4.1. Limitations. This study was not without limitations. It was conducted in a single tertiary care hospital, so its findings cannot be generalized. Although we achieved a satisfactory response rate, some residents did not participate in the study, which could be a result of their busy schedules during the pandemic or simply a lack of interest in the study. Another limitation is that we did not explore the reasons behind positive or negative perceptions of the clinical learning environment. Future researchers could qualitatively explore these factors that contribute towards residents' perceptions to the microlearning environment.

TABLE 3: Specialty-wise scores on HEMLEM items and subscales.

HEMLEM items	Medicine Mean \pm SD	Surgery Mean \pm SD	Pediatrics Mean \pm SD	Gynecology Mean \pm SD	<i>p</i> value
(1) This placement had a welcoming, friendly, and open atmosphere	4.30 \pm 0.61	3.87 \pm 0.97	4.24 \pm 0.66	4.00 \pm 0.92	0.050*
(2) There was a culture where I felt free to ask questions or make comments on this placement	4.19 \pm 0.69	3.94 \pm 0.88	4.28 \pm 0.59	3.90 \pm 1.01	0.357
(3) Staff on this placement were enthusiastic about teaching	4.07 \pm 0.88	3.89 \pm 1.02	4.02 \pm 0.73	4.00 \pm 0.80	0.358
(4) My supervisor showed an interest in me	4.11 \pm 0.94	3.96 \pm 0.79	3.82 \pm 1.08	3.85 \pm 1.10	0.550
(5) My input was valued on this placement	4.21 \pm 0.68	3.99 \pm 0.85	4.07 \pm 0.85	3.73 \pm 1.11	0.153
(6) I was provided with regular, useful, and supportive feedback during this placement	4.10 \pm 0.65	3.89 \pm 1.00	3.80 \pm 1.11	3.64 \pm 0.83	0.292
(7) I had the opportunity to apply my previous knowledge in this placement	4.15 \pm 0.59	4.10 \pm 0.84	4.20 \pm 0.76	4.08 \pm 0.89	0.323
(8) My knowledge and skills were developed on this placement	4.29 \pm 0.64	4.16 \pm 0.77	4.24 \pm 0.64	4.13 \pm 0.78	0.303
(9) This placement helped me put theory into practice	4.52 \pm 0.45	4.21 \pm 0.67	3.85 \pm 0.98	4.03 \pm 0.83	0.038*
(10) I was able to meet my learning objectives on this placement	4.22 \pm 0.68	4.04 \pm 0.76	3.72 \pm 0.85	3.82 \pm 0.84	0.189
(11) I had the opportunity to deal with the patient as a whole on this placement	4.36 \pm 0.60	4.35 \pm 0.61	4.17 \pm 0.65	4.05 \pm 0.90	0.204
(12) I was given tasks suitable for my stage of training on this placement	4.29 \pm 0.76	4.28 \pm 0.59	4.24 \pm 0.58	3.73 \pm 1.07	0.110
Subscale 1: staff attitudes and behaviors	25.77 \pm 5.52	24.54 \pm 4.94	23.43 \pm 4.1	22.32 \pm 3.99	0.043*
Subscale 2: teaching quality	26.83 \pm 4.08	24.97 \pm 4.2	24.92 \pm 3.38	24.63 \pm 3.36	0.065

5. Conclusion

This study aimed to explore the perceptions of postgraduate residents regarding the microlearning environment in their respective clinical placements. Our survey showed a high satisfaction level among residents. Female residents and those aged 25–30 showed higher rates of satisfaction than males and other age groups did. Moreover, internal medicine residents showed the greatest level of satisfaction with their microlearning environment when comparing specialties. The learning environments in all four major specialties were found to be satisfactory; however, there is still scope for improvement. Clinical supervisors, program directors, and curriculum planners could use the findings of this study to identify areas for improvement to enhance postgraduate training and produce competent physicians benefitting the healthcare system overall.

Data Availability

The raw data used to support the findings of this study are available from the corresponding author upon request.

Disclosure

The manuscript has neither been submitted to any other journal nor has been published in parts or full in any journal.

Conflicts of Interest

The authors declare no conflicts of interest.

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