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Evaluation of the Educational Environment in in a Family Medicine Residency Training Program in Riyadh by Use of PHEEM (Postgraduate Hospital Educational Environment Measure)

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Abstract
Family Medicine, which comprises and integrates behavioural, biological and clinical sciences, has been recognized as a separate discipline within Medicine since 1969. Residency training programs, created to enhance learning in this discipline. The educational environment affects teaching and learning processes. A valid and reliable way is needed to assess and evaluate the educational environment in Family Medicine residency training programs in Riyadh. Through a cross-sectional design a study was conducted through the Postgraduate Hospital Educational Environment Measure (PHEEM) between 2017-2018.
Questionnaires distributed in person to 230 family medicine residents, in eight family medicine residency training programs in the region of Riyadh. A total of 178 residents answered the questionnaire out of 230 (77.4%). Perception of teaching was highly rated in all sub-scales by family medicine residents (37.7% ± 9.4%). Followed by Autonomy (33.19% ± 6.7%). While the perception of social support was evaluated at the lowest rate (26.7% ± 6.5%).According to result, the learning environment of the family medicine residency training program found to be satisfactory.
Keywords: *Medical Education, Healthcare professionals, Training Program, Family Medicine.*

Introduction

Within any educational institution, maintenance of a positive environment can enhance the learning process and improve students' results[1]. In the current era of research, major changes have taken place in health and medical education.

Family Medicine, which comprises and integrates behavioural, biological and clinical sciences[2], has been recognized as a separate discipline within Medicine since 1969. Residency training programs, created to enhance learning in this discipline[3], were initiated in Saudi Arabia in 1994[2]. In 1995, the Saudi Board of Family and Community Medicine was formed to integrate the training program into medical education[4]. In the training program, which takes 4 years to complete, residents undertake extensive training by rotating between duties in about 13 specialties in different departments. At the end of this training, residents receive a specialist certificate. There are currently eight Family

Medicine training centers across the Riyadh region, which are all accredited by the Saudi Commission for Health Specialties (SCHS) as training sites for the Saudi Board of Family Medicine[5].

The educational environment affects teaching and learning processes. A valid and reliable way is needed to assess and evaluate the educational environment in Family Medicine residency training programs in Riyadh[6]. The Postgraduate Hospital Educational Environment Measure (PHEEM), developed by Roff et al. (2005)[7,8], is a tool to specifically measure effective learning in the educational sector[9]. It is a 40-item self-administered questionnaire[10], which has been validated in various contexts[11], and assesses respondents' perceptions of their level of autonomy, quality of teaching, and social support during hospital-based postgraduate training. PHEEM has been shown to be a reliable instrument for evaluating quality; thus, in this study, we will use PHEEM to evaluate residents' perceptions of the educational environment within Family Medicine residency training programs in Riyadh[12,13].

The PHEEM tool has been used to evaluate Family Medicine residency training programs in Saudi Arabia before. A study conducted in 2010 found overall scores to be negative, suggesting the need for urgent actions to improve learning[4]. Since 2010, however, many changes have been made to the Family Medicine residency training program curriculum. Therefore, in this study, we will use PHEEM to reassess Family Medicine residents' perceptions of the educational environment in Family Medicine residency training programs in Riyadh, Saudi Arabia. We will use the data collected to compare residents' perceptions of the educational environment across different residency training programs in Riyadh, and evaluate residents' perceptions of the educational environment according to their year/level of residency training.

Methods

This cross-sectional study was conducted among eight Family Medicine residency training centers in Riyadh, Saudi Arabia, between February 2016 and May 2017. A validated hard copy of the PHEEM questionnaire was distributed in person (by the authors) to all Family Medicine residents (230 residents) taking part in these training programs. Forms were cross-examined for errors and completeness.

The required sample size for the current study was calculated by a biostatistician as 149, after taking into consideration a 95% confidence interval (CI) and 5% margin for error. The whole population of Family Medicine residents was included (230 residents), with no exclusions.

Data were analysed and interpreted using Statistical Package for Social Sciences (SPSS, version 20) software[14]. Descriptive statistics of categorized variables were described as frequencies and percentages. Continuous variables were described as means ± SD. Statistical significance was determined at $P < 0.05$.

On the first page of the questionnaire was a consent form, which participants had to sign to take part in the study. They were given the choice to refrain from participating.

The questionnaire was in two parts. The first section contained questions to collect residents' demographic data, including where they were undertaking their residency training, marital status, gender, and training level.

The second section of the questionnaire contained the full 40-item validated PHEEM inventory (used with permission from the original author). The inventory evaluates three dimensions of educational learning, with each item within a subscale reported on a Likert scale of 0–4: quality of teaching (15 items/maximum score of 60), social environment (11 items/maximum score of 44), and autonomy (14 items/maximum score of 56). Maximum scores for each subscale were calculated by multiplying the number of items in the subscale by the maximum score given. The total maximum score across all three subscales is 160, and the minimum score is 0. Higher levels of agreement reflect more beneficial educational environments. Global scores of 0–40 indicate a very poor educational environment, 41–80 indicate plenty of problems, 81–120 indicate

more positive than negative but room for improvement, and 121–160 indicate an excellent educational environment[8]. Scores for the overall inventory, and each of the three subscales, are summarized as mean ± SD[15].

Ethical approval for the study was sought and obtained from the Institutional Review Board of the author's home institution. Data privacy was maintained during the collection process, interpretation and formation of results. To maintain confidentiality, only the researcher was party to respondents' answers.

Results

Reliability

The Cronbach's alpha score was at 0.722 for the 40 items, which reflects reliability and internal consistency of the items in the assessment tool. Also, when the data were analyzed to exclude each question in turn, there was no significant change in the score, which confirmed that all questions were relevant and should be included.

Participants and response rate

Of the 230 residents who received a questionnaire, 178 completed and returned it. The number of residents in each of the eight Family Medicine residency training programs varied between 4 and 50, and the range of residents' total number of years of experience in a Family Medicine training program was 2–4 years.

Description of respondents

Table 1 provides a summary of the demographic data collected from respondents and give details regard subscales in each domain and total in males and female.

Category	Number of Residents (%)	Total PHEEM Score (Mean)	Subscale	Autonomy	Perception of Teaching	Perception of Social Support	Total
Male	79 (44.4)	95	**Males Mean**	32.8	36.7	26	95.5
Female	99 (55.6)	99	**Males SD**	6.6	9.7	6.9	21.9
Juniors (R1 and R2 level)	116 (65.2)	96	**Females Mean**	33.5	38.5	27.3	99.3
Seniors (R3 and R4 level)	62 (34.8)	97	**Females SD**	6.8	9.2	6.1	20.3

Table 2 shows the distribution of respondents by Family Medicine residency training program, and the average PHEEM score by center and subscale.

Training Centre	Number of Residents	Autonomy	Training	Social Support	Average PHEEM Score (0–160) (Mean)	SD
1	40	33.57	37.22	27.77	98.57	19.92
2	16	34.05	41.25	27.23	103.56	18.67
3	28	32.6	37.1	27.14	96.85	20.42
4–6 (three joined programs)	35	32.71	34.28	26.2	93.2	25.2
7	50	32.96	38.56	24.92	96.44	19.9
8	8	35.12	35	23.25	112.37	18.27
Total	177	33.2	37.72	26.71	97.71	21.05

PHEEM results

The mean overall PHEEM score was 97.71 (SD = 21.04). (**Table 2**).

In terms of the 'Autonomy' subscale, the highest PHEEM score was reported by residents of the Family Medicine training program at center 8, while the lowest score for perception of autonomy was reported by residents at training center 3. Respondents at all training centers rated their perceptions of 'Teaching' higher than the other two subscales; nevertheless, respondents from training center 2 reported the highest scores for teaching. Respondents at all training centers rated their perceptions of 'Social support' lower than the other two subscales; nevertheless, respondents from training center 1 reported the highest scores for social support (Table 2).

Correlations between participant's characteristics and PHEEM scores

The correlation of autonomy sub-scale with the perception of teaching resulted positive with r=0.82, n=177, p=0.000. Along with social support resulted positive with r=0.764, n=178, p=0.000. Also the correlation between teaching sub-scale with social support was found positive with r=0.771, n=177, p=0.000.

Furthermore, the correlation between Total Sub-scale with Autonomy was strongly positive with r=0.929, n=177, p=0.000. In this context, the correlation between Total Sub-scale with Teaching Sub-scale was also found more strongly positive than autonomy with r=0.950, n=177, p=0.000. Lastly, the correlation between the total variable and social support variable was positive but lower in comparison with the autonomy and teaching sub-scales with r=0.901, n=177, p=0.000.

The results explained a strong positive correlation between the three sub-scales of PHEEM and it also suggested that the PHEEM had been conducted in the right direction. Further, the correlation described that the strong positive correlation was found in the Teaching sub-scale, which enunciated that room for betterment could enhance the learning environment in Family Residency Training Program.

In terms of scores for the Autonomy subscale, our results showed that females have scored higher than males in the mean difference (33.52 versus 32.78),

and that the most positive perceptions of this subscale were reported at training center 8 and the least positive perceptions were reported at training center 3.

In terms of scores for the Social support subscale, our results suggest that residents training at training center 1, followed by training center 2, reported the most positive rate of social support. Residents at training center 8 reported the least positive perceptions of social support.

In terms of scores for the Teaching subscale, respondents reported the most positive rate of teaching at training center 2, while the score for this subscale for training center 7 suggests there is room for improvement.

In terms of the overall PHEEM scores, the most positive rate across all three subscales were reported by residents training at training center 8 (mean – 112.73).

Discussion

This study used the PHEEM tool to assess residents' perceptions of their learning environments at training centers for Family Medicine residency training programs. Residents from eight Family Medicine training centers in Riyadh, Saudi Arabia, were included in the sample population – all of these centers use the same curriculum. Previous work has validated use of the PHEEM tool as a way to evaluate educational learning and educational environments, and the tool has been used to evaluate the strengths and weaknesses of learning environments[9].

The present study revealed that residents at training center 8 reported the highest overall PHEEM scores. This may be explained by the fact that this center has a small number of residents and a good number of trainers. Training center 8 is a tertiary hospital with good facilities. However, all of the training centers included in the study reported positive PHEEM scores, both overall and by subscale, showing improvement on previous studies. Similar results between training centers may be associated with the fact that they all follow a similar curriculum.

Data were collected from both junior (levels R1 and R2) and senior (levels R3 and R4) residents. Despite a lower proportion of seniors versus juniors (36% and 64%), our results indicate that most of the resident (97% of seniors and 96% of juniors) were satisfied with their learning environments. This difference may be associated with differences in years of experience, longer duration of learning, and exposure to more rotations between juniors and seniors.

When a similar study was conducted in Riyadh in 2010, overall PHEEM scores were negative, suggesting the need for urgent actions to improve learning[4]. Since then, the Family Medicine residency training program curriculum has been changed twice; once in 2014, with a further update in 2016[16]. Further to these changes to the curriculum, the present study reveals a high overall mean PHEEM score (97.7 ± 21.0 SD), indicating that residents now perceive their learning environment more favorably and that they are more content with their surroundings.

Many studies around the world have used PHEEM to evaluate learning environments. For example, in a 2007 UK study, PHEEM was used to evaluate perceptions of the educational environment among Intensive Care Unit (ICU) residents. The results of this study showed that ICU offers a good, supportive environment for trainees[13]. On the other hand, a 2013 study in Singapore used PHEEM to evaluate the educational environment of British and American postgraduate Psychiatry training programs in the Asian setting. This study reported that residents were dissatisfied with their new structured program, and that they had low perceptions of clinical teachers in both training programs[6].

In a 2016 study conducted at a children's hospital in Lahore, Pakistan, postgraduate residents were surveyed to evaluate their perceptions of the clinical educational environment, and to explore any connections between their perceptions, specialties and year of residency. Of the 160 residents who received the questionnaire, 114 responded positively about their educational environment. They also

spoke highly of their perceptions of autonomy, teaching and social support[17]. Similarly, in a study involving 209 pediatric interns and 60 of their supervisors from medical complexes in South Africa, participants took psychometric tests (involving construct validity and internal consistency), as well as responded to the PHEEM questionnaire. Results were examined using factor analysis and Cronbach's alpha test. Sixty-nine percent of interns responded to the questionnaire, and most of these returned positive, rather than negative, PHEEM scores[18].

Research conducted at King Fahad Hospital of Dammam University suggested that there was an association between gender and perceptions of a positive educational environment, i.e., that males had more positive perceptions than females[19]. This is contrary to the results of the present study, in which we found that females were more satisfied than males, particularly in terms of the Autonomy subscale. Females also reported greater satisfaction with the tasks that were given to them during their training. This result suggests a non-conventional attribute of learning in which females are more positive, according to self-reported perception levels. Previous research in this area has used the PHEEM questionnaire to assess challenges associated with learning environments. For example, the tool has been widely used in various medical environments to obtain insights into strengths and weaknesses of the system[20]. A notable point is that this study has allowed us to observe improvements in medical training centers. According to our results, the three training centers forming a group of related training programs (centers 4–6) received the lowest PHEEM score of 93.20. This might be explained by the fact that the training programs at these centers are new – they were only started in 2015, thus the trainers at these centers are likely to be less experienced than those at other, more established programs.

In terms of teaching, centers 4–6 also received the lowest score for this subscale (34.28 versus the highest score received by center 8 of 112.37). This demonstrates that there remains an urgent need to improve residents' perceptions of teaching so as to

improve the standard of the learning environment at these training centers. It is also possible that other challenges exist, including issues of staffing or the management structure of the training program, and the need for proper supervision[10].

Limitations

We consider that the response rate is a limitation of this study – we expected a better response rate so as to give a more representative view of residents' perceptions of their educational environment.

Conclusion

Using the PHEEM instrument, this study found that residents' perceptions of their learning environment in the all Family Residency training program centers are satisfactory. Females resident were more positive than males resident. There was variation between the training centers in different sub-scale. However, across all training centers, action should be taken to improve residents' perceptions of their learning environments.

Implications of findings for future research

Recommendations for future research are to conduct similar studies in different regions of Saudi Arabia to enable comparisons between regions, and to use data collected about weaknesses of the training programs to inform the Saudi Commission for Health Specialties and improve learning environments across the whole Kingdom.

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