

Trainers Knowledge, Attitude and Practice in Family Medicine about Virtual Learning: A Cross-Sectional Study

Mohammed Ali Altokhais^{1*}, Faisal Eid Almutairi¹, Abdullah Khalid Alburayk¹, Khalid fares Alotaibi¹, Moawadh Alotaibi², Ghada Alarfaj², Saad Albattal², Abdelaziz Alrasheed² and Mostafa Kofi²

¹Family Medicine Residents, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

²Family Medicine Consultant, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

*Corresponding Author: Mohammed Ali Altokhais, Family Medicine Residents, Prince Sultan Military Medical City, Riyadh, Saudi Arabia.

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Abstract

Background: During covid19 pandemic, virtual learning has been used in the family medicine residency program. However, the improvement of virtual learning from the perspective of family medicine trainers is warranted.

Objectives: To assess family medicine trainers' attitude and practice about virtual learning as well as to identify areas for improvement in virtual learning.

Subjects and Methods: A cross-sectional study was conducted at Family Medicine Department, Prince Sultan Military Medical City (PSMMC), Riyadh, Kingdom of Saudi Arabia (KSA), from Dec 20th, 2021 to Apr 20th, 2022. All Family Medicine trainers were included in this study. Online survey was used to collect participants response using a valid questionnaire

Results: The study included 81 trainers. Males represented 55.6% of them and 60.5% aged between 25 and 35 years. Overall, more than half of the trainers (58%) expressed positive attitude towards virtual learning. Male trainers expressed higher more positive attitude compared to females towards virtual learning (68.9% vs 44.4%), $p = 0.027$. Trainees in the age group 36-45 years had the highest rate of positive attitude towards virtual learning (76.9%) whereas those aged over 45 years had the lowest rate (33.3%), $p = 0.043$. Female trainers were more than males to have a working well access to a device for teaching online (94.4% vs. 86.7%), $p = 0.024$. On the other hand, male trainers were more likely than females to agree that their residents' learning was as much during COVID-19 as they were before switching to virtual learning (86.7% vs. 33.3%), $p < 0.001$.

Conclusion: A considerable proportion of family medicine trainers expressed negative attitude towards virtual learning; particularly females and older trainers (>45 years old).

Keywords: Trainers; Family Medicine; Attitude; Virtual Learning; Saudi Arabia

Introduction

The family medicine residency program at family medicine department is an accredited 3 years program by the Saudi Council for health specialty which is accreditation for health care professionals in Saudi Arabia. During covid19 we had to use virtual

learning so this study to explore how to improve virtual learning from the perspective of family medicine trainers. So this work is to describe trainers' perspectives toward virtual learning so aiming to improve teaching and learning proses which will ultimately improve patient care.

Review of Literature

Recently Serena Brusamento, *et al.* in 2019 [1], conducted a study about Digital Health Professions Education in the Field of Pediatrics: Systematic Review and Meta-Analysis by the Digital Health Education Collaboration. Their research objective was to see if digital education can replace the traditional one to improve post-registration health professionals' knowledge, skills, satisfaction and attitude in the field of pediatric. They completed a systematic review of the literature by following the Cochrane methodology. They searched 7 major electronic databases for articles published from January 1990 to August 2017. They found that there is no difference between digital education for post-registration health professions education in pediatrics and traditional learning and Better than no learning.

Another systematic review and meta-analysis by Bhone Myint Kyaw, *et al.* in 2019 [2], About Offline Digital Education for Medical Students. Their objective was to assess the effectiveness of offline digital education compared with traditional education also compared with a different form of offline digital education such as CD-ROM or PowerPoint presentations in improving knowledge, skills, attitude and satisfaction of medical students. They searched seven major electronic databases from January 1990 to August 2017 for randomized controlled trials (RCTs) or cluster RCTs. They found that offline digital education is the same effect as traditional learning in terms of medical students' knowledge and may be more effective than traditional learning in terms of medical students' skills. In addition, there is a need to further search in students' attitudes and satisfaction with offline digital education as well as its cost-effectiveness, changes in its accessibility or availability, and any resulting adverse effects.

On the other hand, another systematic review and meta-analysis of seven randomized clinical trials conducted by Gerard Dunleavy, *et al.* in 2019 [3], The study about Mobile Digital Education for Health Professions. They carried out a systematic review of the literature by following the Cochrane methodology. They found using mobile devices encourages expanding health professions education in order to address the shortage of health professionals in the world.

In Monika Semwal, *et al.* trial which was conducted in 2019 [4], to evaluate the effectiveness of digital education compared

with various controls in improving learners' knowledge, skills, attitudes, and satisfaction to deliver smoking cessation therapy and assess self-efficacy or self-rated competence of health professionals in delivering smoking cessation therapy. They searched seven electronic databases and two trial registers for randomized controlled trials published between January 1990 and August 2017. They used gold standard Cochrane methods to select and extract data and appraise eligible studies. They found that digital education is the same effect as usual learning in improving health professionals' knowledge and skill for delivering smoking cessation therapy.

BhoneMyintKyaw, *et al.* in 2019 [5], Different trials conducted about virtual Reality for Health Professions Education. The goal of this research was to evaluate the effectiveness of Virtual reality for educating health professionals and improving their knowledge, cognitive skills, attitudes, and satisfaction. They found virtual reality improves post-intervention knowledge and skills outcomes of health professionals when they compared it with traditional education, online or offline digital education.

In BhoneMyintKyaw, *et al.* study in 2019 [6], which was about Effectiveness of Digital Education on Communication Skills Among Medical Students. They found that the digital education is as effective as traditional learning in medical students' communication skills training. In addition, it is the same effect as traditional learning for communication skills and knowledge.

Another study by Pradeep Paul George, *et al.* in 2019 [7], It was about Online Digital Education for Postregistration Training of Medical Doctors. They found that online digital education and blended learning are equal to self-directed learning for training practicing physicians. In addition, they found in some studies the online digital education and blended learning will improve learning outcomes compared to self-directed learning.

Lorraine Tudor Car, *et al.* study in 2019 [8], intended to evaluate effectiveness of digital education in improving the adoption of clinical practice guidelines. They included studies with different languages evaluating the effectiveness of digital education on clinical practice guidelines compared to other forms of education or no intervention in healthcare professionals. They found the health professions digital education on clinical practice

guidelines is as effective as traditional learning and more effective than no intervention in terms of knowledge. Also, there is little or no difference in healthcare professionals' behaviors and patient outcomes.

Alberto Vaona, *et al.* did a study in 2018 [9], to assess the effects of e-learning programmes versus traditional learning in licensed health professionals for improving patient outcomes or health professionals' behaviors, skills and knowledge. They found that in comparison to traditional learning, e-learning may make little or no difference in patient outcomes or health professionals' behaviors, skills or knowledge. As e-learning could be more successful than traditional learning in particular medical education settings, general claims of it as it is more effective than traditional learning may be misleading.

In Scott Reeves, *et al.* study that was conducted in 2017 [10], the study was about Interprofessional online learning for primary healthcare: findings from a scoping review. The research shows the findings from a scoping review which explored the nature of interprofessional online learning in primary healthcare. Scoping reviews are used by researchers to explore healthcare evidence. They allow the clarification of complex areas of inquiry and refine subsequent research studies. They found that E-learning can enhance an education experience, support development, ease time constraints, overcome geographic limitations and can offer greater flexibility. It can also isolate the learners and lose its benefits by technical problems.

There is a pressing need for such work, to describe the current status of perception of trainers towards the virtual learning process and environment, by these we will be able to identify areas for improvement and gaps in skills and knowledge towards best practices and process for the best benefit of the virtual learning environment.

The aim of this study is to improve learning process of the trainees and to improve Knowledge retained by them through emphasizing on innovative learning methods such as virtual learning.

- To assess trainers knowledge, attitude and practice in family medicine about virtual learning.
- To identify areas for improvement in virtual learning in family medicine for trainers.

Methods

Study design

Cross-sectional study. The study was conducted at Family Medicine Department, Prince Sultan Military Medical City (PSMMC), Riyadh, Kingdom of Saudi Arabia (KSA), from Dec20th, 2021 to Apr 20th, 2022.

Target population

Family Medicine trainers at Prince Sultan Military Medical City, Riyadh.

Inclusion/Exclusion criteria

All Family Medicine trainers only such as consultants, senior registrar at Prince Sultan Military Medical City were included in this study, both males and females. All non-Family Medicine trainers will be excluded. Comprehensive sample of 81 trainers.

Sample size

Collectively, 81 Family Medicine trainers working at family medicine department at Prince Sultan Military Medical City in Riyadh were recruited to participate in the study.

Sampling method

Online survey was used to collect participants response. Repeated submissions from the same participants were prohibited through linking each response with their IP address in the web page.

Data collection tool (instrument)

The data were collected by online questionnaire through using close ended questions. The questionnaire was reviewed by 3 experts' consultants in Family medicine department at Prince Sultan Military medical city and after the revision they validated the questionnaire, also we conducted a pilot study involving 10 participant to check responses and adjust as advised. The responses of the participants to the attitude statements were scored in the way that, the highest the score the more positive the attitude towards virtual learning. Total score and its percentage were computed. Trainers scored below 60% were considered having "negative attitude" whereas those scored 60% or more were considered having "positive attitude".

Data management and statistical plan

Data collected were entered to Statistical Package for Social Sciences (SPSS) software version 28. Descriptive statistics were performed in the form of frequency distribution and proportion for qualitative variables. Analytic statistics were done to get the p value by using chi square or Fischer Exact tests to investigate for the association between two qualitative variables and p- value <0.05 was considered as a cut-off level for statistical significance.

Ethical considerations

Participants were be asked for their names nor any identifying information, therefore, their confidentiality was protected. Participants were not paid for their participation and were entirely voluntary and their privacy was secured. Ethical approval was obtained before conducting the study from the local Research and Ethics committee at Prince Sultan Military Medical City, Riyadh. An online consent was obtained from all participants prior to data collection.

Results

Demographic characteristics

The study included 81 trainers. Their demographic characteristics are summarized in table 1. Males represented 55.6% of them and 60.5% aged between 25 and 35 years. Most of them (61.7%) were married.

Demographic variables	Frequency	Percentage
Gender		
Male	45	55.6
Female	36	44.4
Age (years)		
25-35	49	60.5
36-45	26	32.1
>45	6	7.4
Marital status		
Single	29	35.8
Married	50	61.7
Divorced	2	2.5

Table 1: Demographic characteristics of the participants (n = 81).

Attitude towards virtual learning

From Table 2, it is shown that 42% and 33.3% of the trainers perceived virtual learning as a moderately effective or very effective

tool, respectively. Similarly, 22.2% and 37.1% of them reported that their hospital was moderately helpful or very helpful, respectively in offering them the resources to teach from home. On the other hand, 45.7% of the trainers considered virtual learning as not at all stressful for them during the COVID-19 pandemic. Almost half of them (50.6%) obsoletely enjoyed virtual learning while 34.6% enjoyed it, however they would like to change a few things. More than one-third (37%) of the participants believed that face to face learning is more important for them than virtual learning while 53.1% believed that both are of the same importance. Overall, 38.3% of the participants felt virtual learning as excellent whereas only 7.4% felt it as below average. Majority of the trainers (97.5%) were satisfied with the technology and software they were using for online teaching.

Statements about virtual learning	Frequency	Percent-age
How effective virtual learning been for you?		
Not at all effective	4	4.9
Slightly effective	2	2.5
Moderately effective	34	42.0
Very effective	27	33.3
Extremely effective	14	17.3
How helpful you hospital has been in offering you the resources to teach from home?		
Not at all helpful	4	4.9
Slightly helpful	13	16.0
Moderately helpful	18	22.2
Very helpful	30	37.1
Extremely helpful	16	19.8
How stressful is virtual learning for you during the COVID-19 pandemic?		
Not at all stressful	37	45.7
Slightly stressful	18	22.2
Moderately stressful	10	12.3
Very stressful	4	4.9
Extremely stressful	12	14.8
Do you enjoy virtual learning?		
Yes, absolutely	41	50.6
Yes, but I would like to change a few things	28	34.6
No, there are quite few challenges	12	14.8

How important is virtual learning compared to face to face learning for you?		
Face to face learning is better	30	37.0
Virtual learning is better	8	9.9
Both are with the same effect	43	53.1
How do you feel overall about virtual learning?		
Below average	6	7.4
Average	20	24.7
Good	24	29.6
Excellent	31	38.3
Are you satisfied with the technology and software you are using for online teaching?		
Yes	79	97.5
No	2	2.5

Table 2: Attitude of trainers towards virtual learning (n = 81).

Overall, more than half of the trainers (58%) expressed positive attitude towards virtual learning as evident from Figure 1.

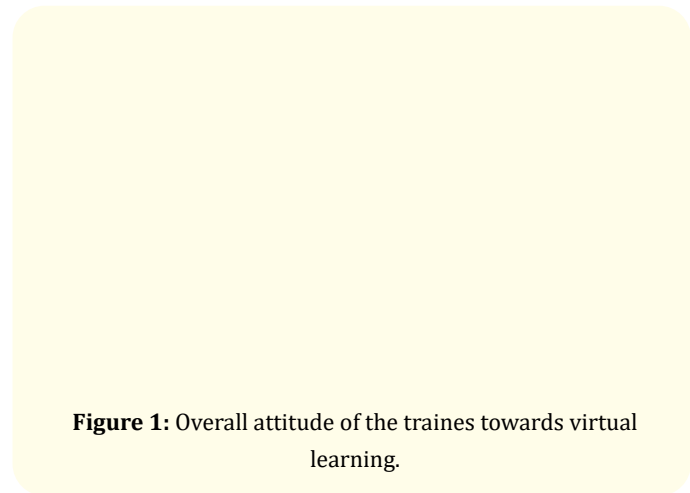


Figure 1: Overall attitude of the trainees towards virtual learning.

Male trainers expressed higher more positive attitude compared to females towards virtual learning (68.9% vs 44.4%), = p = 0.027. Trainees in the age group 36-45 years had the highest rate of positive attitude towards virtual learning (76.9%) whereas those aged over 45 years had the lowest rate (33.3%), p = 0.043 (Table 3).

	Attitude towards virtual learning		p-value
	Negative N = 34 N (%)	Positive N = 47 N (%)	
Gender			
Male (n = 45)	14 (31.1)	31 (68.9)	0.027
Female (n = 36)	20 (55.6)	16 (44.4)	
Age (years)			
25-35 (n = 49)	24 (49.0)	25 (51.0)	0.043
36-45 (n = 26)	6 (23.1)	20 (76.9)	
>45 (n = 6)	4 (66.7)	2 (33.3)	
Marital status			
Single (n = 29)	14 (48.3)	15 (51.7)	0.368
Married (n = 50)	20 (40.0)	30 (60.0)	
Divorced (n = 2)	0 (0.0)	2 (100)	

Table 3: Factors associated with attitude of the trainers towards virtual learning.

Practice of virtual learning

Majority of the trainers (87.7%) spent between one and three hours on an average daily in virtual learning and majority of them (90.1%) had an access to a device for teaching online; mainly laptop (64.2%). More than one-quarter (27.2%) of the trainers described their experience in teaching residents from home as

excellent compared to that of teaching at hospital whereas only 2.5% described it as a poor experience. Almost two-thirds (63%) of the trainers agreed that their residents' learning were as much during COVID-19 as they were before switching to virtual learning (Table 4).

Practice of virtual learning-related statements	Frequency	Percentage
How much time do you spend each day on an average in virtual learning in hours?		
1-3	71	87.7
4-7	10	12.3
Do you have access to a device for teaching online		
Yes	73	90.1
Yes, but it doesn't work well	6	7.4
No, I share with others	2	2.5
What device do you use for virtual learning?		
Laptop	52	64.2
Desktop	8	9.9
Tablet	12	14.8
Smartphone	9	11.1
How was your experience in teaching residents from home as compared to teaching at hospital?		
Poor	2	2.5
Below average	10	12.3
Average	24	29.6
Good	23	28.4
Excellent	22	27.2
Are your residents' learning as much during COVID-19 as they were before switching to virtual learning		
Yes	51	63.0
No	30	37.0

Table 4: Practice of virtual learning among the trainers (n = 81).

Factors associated with practice of virtual learning among the trainers

Trainers' gender

From Table 5, it is shown that female trainers were more than males to have a working well access to a device for teaching online

(94.4% vs. 86.7%), p = 0.024. On the other hand, male trainers were more likely than females to agree that their residents' learning was as much during COVID-19 as they were before switching to virtual learning (86.7% vs. 33.3%), p < 0.001.

	Males N = 45 N (%)	Females N = 36 N (%)	p-value
How much time do you spend each day on an average in virtual learning in hours?			
1-3 (n = 71)	39 (86.7)	32 (88.9)	
4-7 (n = 10)	6 (13.3)	4 (11.1)	0.519*
Do you have access to a device for teaching online			
Yes (n = 73)	39 (86.7)	34 (94.4)	
Yes, but it doesn't work well (n = 6)	6 (13.3)	0 (0.0)	
No, I share with others (n = 2)	0 (0.0)	2 (5.6)	0.024**

Whar device do you use for virtual learning?			
Laptop (n = 52)	24 (53.3)	28 (77.8)	
Desktop (n = 8)	6 (13.3)	2 (5.6)	
Tablet (n = 12)	8 (17.8)	4 (11.1)	
Smartphone (n = 9)	7 (15.6)	2 (5.6)	0.139**
How was your experience in teaching residents from home as compared to teaching at hospital?			
Poor (n = 2)	2 (4.4)	0 (0.0)	
Below average (n = 10)	4 (8.9)	6 (16.7)	
Average (n = 24)	10 (22.2)	14 (38.9)	
Good (n = 23)	15 (33.3)	8 (22.2)	
Excellent (n = 22)	14 (31.1)	8 (22.2)	0.206**
Are your residents` learning as much during COVID-19 as they were before switching to virtual learning			
Yes (n = 51)	39 (86.7)	12 (33.3)	
No (n = 30)	6 (13.3)	24 (66.7)	<0.001

Table 5: Association between family medicine trainers` gender and practice of virtual learning.

*Fischer Exact test; **Chi-square test.

Trainers` age

Majority of family medicine trainers aged between 25 and 35 years (95.9%) compared to 66.7% of those aged over 45 years spent on the average between one and three hours each day in virtual learning whereas 33.3% of those aged over 45 years compared to only 4.1% of those aged between 25 and 35 years spent between 4 and 7 hours on the average each day in virtual learning. This difference was statistically significant, p = 0.016. All

family medicine trainers used laptop in virtual learning compared to 69.4% of those aged between 25 and 35 years, p = 0.003. Two-thirds of family medicine trainers aged over 45 years described their experience in teaching residents from home compared to teaching at hospital as an average whereas 53.8% of those aged between 36 and 45 years described it as good and 30.8% as excellent. These differences were statistically significant, p < 0.001 (Table 6).

	25-35 years N = 49 N (%)	36-45 years N = 26 N (%)	>45 years N = 6 N (%)	p-value*
How much time do you spend each day on an average in virtual learning in hours?				
1-3 (n = 71)	47 (95.9)	20 (76.9)	4 (66.7)	
4-7 (n = 10)	2 (4.1)	6 (23.1)	2 (33.3)	0.016
Do you have access to a device for teaching online				
Yes (n = 73)	43 (87.8)	24 (92.3)	6 (100)	
Yes, but it doesn't work well (n = 6)	4 (8.2)	2 (7.7)	0 (0.0)	
No, I share with others (n = 2)	2 (4.1)	0 (0.0)	0 (0.0)	0.754
Whar device do you use for virtual learning?				
Laptop (n = 52)	34 (69.4)	12 (46.2)	6 (100)	
Desktop (n = 8)	8 (16.3)	0 (0.0)	0 (0.0)	
Tablet (n = 12)	4 (8.2)	8 (30.8)	0 (0.0)	
Smartphone (n = 9)	3 (6.1)	6 (23.1)	0 (0.0)	0.003

How was your experience in teaching residents from home as compared to teaching at hospital?				
Poor (n = 2)	0 (0.0)	2 (7.7)	0 (0.0)	
Below average (n = 10)	6 (12.2)	2 (7.7)	2 (33.3)	
Average (n = 24)	20 (40.8)	0 (0.0)	4 (66.7)	
Good (n = 23)	9 (18.4)	14 (53.8)	0 (0.0)	
Excellent (n = 22)	14 (28.6)	8 (30.8)	0 (0.0)	<0.001
Are your residents` learning as much during COVID-19 as they were before switching to virtual learning				
Yes (n = 51)	29 (59.2)	20 (76.9)	2 (33.3)	
No (n = 30)	20 (40.8)	6 (23.1)	4 (66.7)	0.094

Table 6: Association between family medicine trainers` age and practice of virtual learning.

*Chi-square test .

Trainers` marital status

As shown in **Table 7**, there was a statistically significant association between trainers` marital status and average hours spent each day in virtual teaching as majority of singles (93.1%) compared to 88% of married trainers spent between one and three

hours while all divorced trainers spent between 4 and 7 hours, p = 0.001. About half (48.3%) and 27.6% of singles used laptop and desktop, respectively in virtual learning whereas most of married trainers (76%) used laptop and none used desktop in virtual learning, p < 0.001.

	Single N = 29 N (%)	Married N = 50 N (%)	Divorced N = 2 N (%)	p-value*
How much time do you spend each day on an average in virtual learning in hours?				
1-3 (n = 71)	27 (93.1)	44 (88.0)	0 (0.0)	
4-7 (n = 10)	2 (6.9)	6 (12.0)	2 (100)	0.001
Do you have access to a device for teaching online				
Yes (n = 73)	23 (79.3)	48 (96.0)	2 (100)	
Yes, but it desn`t work well (n = 6)	4 (13.8)	2 (4.0)	0 (0.0)	
No, I share with others (n = 2)	2 (6.9)	0 (0.0)	0 (0.0)	0.152
Whar device do you use for virtual learning?				
Laptop (n = 52)	14 (48.3)	38 (76.0)	0 (0.0)	
Desktop (n = 8)	8 (27.6)	0 (0.0)	0 (0.0)	
Tablet (n = 12)	4 (13.8)	6 (12.0)	2 (100)	
Smartphone (n = 9)	3 (10.3)	6 (12.0)	0 (0.0)	<0.001
How was your experience in teaching residents from home as compared to teaching at hospital?				
Poor (n = 2)	0 (0.0)	2 (4.0)	0 (0.0)	
Below average (n = 10)	4 (13.8)	6 (12.0)	0 (0.0)	
Average (n = 24)	10 (34.5)	14 (28.0)	0 (0.0)	
Good (n = 23)	7 (24.1)	16 (32.0)	0 (0.0)	
Excellent (n = 22)	8 (27.6)	12 (24.0)	2 (100)	0.485
Are your residents` learning as much during COVID-19 as they were before switching to virtual learning				
Yes (n = 51)	21 (72.4)	28 (56.0)	2 (100)	
No (n = 30)	8 (27.6)	22 (44.0)	0 (0.0)	0.189

Table 7: Association between family medicine trainers` marital status and practice of virtual learning.

*Chi-square test.

Trainers` attitude towards virtual learning

Trainers with positive attitude towards virtual learning were more likely to have access to a device for teaching online compared to those who expressed negative attitude (95.7% vs. 82.4%), p = 0.006. Almost a quarter of trainers with positive attitude (25.5%) had tablets as a device for virtual learning compared to none of those with negative attitude, p = 0.016. A considerable proportion (42.6%) of trainers with positive attitude towards virtual learning compared to only 5.9% of those with negative attitude described

their experience in teaching residents from home as compared to teaching at hospital as excellent, p < 0.001. Most of trainers with negative attitude towards virtual learning (70.6%) considered their residents` learning as much during COVID-19 as they were before switching to virtual learning whereas majority of those with positive attitude (87.2%) considered a difference between their residents` learning during COVID-19 as they were before switching to virtual learning, p < 0.001 (Table 8).

	Negative N = 34 N (%)	Positive N = 47 N (%)	p-value
How much time do you spend each day on an average in virtual learning in hours? 1-3 (n = 71) 4-7 (n = 10)	32 (94.1) 2 (5.9)	39 (83.0) 8 (17.0)	0.121
Do you have access to a device for teaching online Yes (n = 73) Yes, but it doesn't work well (n = 6) No, I share with others (n = 2)	28 (82.4) 6 (17.6) 0 (0.0)	45 (95.7) 0 (0.0) 2 (4.3)	0.006
What device do you use for virtual learning? Laptop (n = 52) Desktop (n = 8) Tablet (n = 12) Smartphone (n = 9)	26 (76.5) 4 (11.8) 0 (0.0) 4 (11.8)	26 (55.3) 4 (8.5) 12 (25.5) 5 (10.6)	0.016
How was your experience in teaching residents from home as compared to teaching at hospital? Poor (n = 2) Below average (n = 10) Average (n = 24) Good (n = 23) Excellent (n = 22)	2 (5.9) 8 (23.5) 18 (52.9) 4 (11.8) 2 (5.9)	0 (0.0) 2 (4.3) 6 (12.8) 19 (40.4) 20 (42.6)	<0.001
Are your residents` learning as much during COVID-19 as they were before switching to virtual learning Yes (n = 51) No (n = 30)	24 (70.6) 10 (29.4)	6 (12.8) 41 (87.2)	<0.001

Table 8: Association between family medicine trainers` attitude towards virtual learning and its practice.

*Fischer Exact test; **Chi-square test.

Discussion

Virtual learning assists in overcoming geographical, and time barriers through accessing educational materials without place or

time restrictions, allowing students to learn at their own place and time [11]. However, effectiveness and difficulty associated with this method are not clear; particularly in the Kingdom of Saudi

Arabia. Therefore, the present study was implemented to assess family medicine trainers perception and practice regarding virtual learning in order to identify area that need improvement in this regards. Mardiana and Daniels (2019) reported that perception of the trainers towards virtual learning is an important component in the revolution of the learning process which enforces them to be more active in teaching [12].

Virtual learning has some advantages over traditional face to face learning including the fact that greater number of learners can participate in this type of education and also virtual learning applications support the delivery of educational materials according to the needs of learners and teaching processes [13,14].

In the current study, most of family medicine trainers (75.3%) perceived virtual learning as an effective tool. Additionally, more than half of them, considered their hospitals as helpful in offering them the resources to teach from home. However, less than half of them considered virtual learning as not at all stressful for them during the COVID-19 pandemic. Also, majority of the trainers enjoyed virtual learning, however a considerable proportion of them would like to change a few things and more than half (53.1%) of family medicine trainers believed that both of face to face learning and virtual learning are of the same importance. These findings are comparable to what has been documented in several systematic review and meta-analysis studies conducted in the last few years. In a recent systematic review and meta-analysis included 20 studies in the field of pediatrics, all studies reported that virtual learning was either as effective as or higher effective than the traditional method for all studied outcomes including satisfaction, skills, knowledge, and attitude of pediatricians [1]. Another systematic review and meta-analysis conducted among medical students revealed that virtual learning was as effective as traditional learning in improving knowledge and even more effective than it in improving skills of medical students [2]. Also, a systematic review and meta analysis concluded that virtual learning was either equivalent or even superior to traditional learning methods for improving health professionals' knowledge and skill and this is very important in overcoming the shortage of health professionals all over the world [3]. No difference was observed in another study between virtual learning and traditional one concerning training health professionals to provide smoking cessation therapy. However, improved attitude following virtual

learning compared with traditional learning was observed [4]. Kyaw, *et al.* (2019) in their systematic review and meta analysis observed a small improvement in health professionals' knowledge and moderate-to-large improvement in their skills after virtual learning compared with traditional learning [5]. On the other hand, another systematic review and meta analysis included 12 studies carried out on medical students showed no statistically significant difference between virtual education and traditional learning regarding communication skills and knowledge [6]. In a large systematic review and meta-analysis included 93 studies, the effect of virtual learning on post-intervention knowledge, skills, attitude, satisfaction, and practice was inconsistent as it ranged between no difference and higher post-intervention score in the virtual learning group compared to traditional learning group [7]. Lorainne Tudor Car, *et al.* (2019) [8], found the virtual learning of health professions on clinical practice guidelines was as effect as traditional learning and more effective than no intervention in terms of knowledge. However, there was little or no difference in thie behaviors and patient outcomes. The effects of e-learning programmes versus traditional learning was assessed among health professionals and results revealed that in comparison to traditional learning, e-learning may had little or no difference in patient outcomes or health professionals' behaviors, skills or knowledge [9]. In 2017 [10], Scott Reeves, *et al.* found that E-learning can enhance an education experience, support development, ease time constraints, overcome geographic limitations and can offer greater flexibility. It can also isolate the learners and loss its benefits by technical problems.

All of the aforementioned studies were systematic review and meta analysis; despite being of high evidence-based value, it is subjected to high risks of bias and inconsistency as a result of heterogeneity in study results and characteristics of participants, types of interventions, and instruments used in outcome measurement [15].

In the present study, overall, 38.3% of the participants felt virtual learning as an excellent learning facility whereas only 7.4% felt it as below average and majority of them (97.5%) were satisfied with the technology and software they were using for online teaching. Also, a favorable attitude of trainers towards virtual learning in the educational process has been observed by others [16,17].

In the present study, male and middle aged (36-45 years) trainers expressed higher positive attitude towards virtual learning compared to females. The same has been observed by others [18,19]. Additionally, most of female trainers viewed their residents' learning not the same during COVID-19 as they were before switching to virtual learning and this is can be explained by the fact that male and middle aged tainers are usually more experienced with computer skills and technology than others, which in turns, affects positively their confidence in dealing with computer.

The current study revealed that female trainers had more access to device in teaching online than males. This is could be attributed to the fact that females are usually more committed [20] and had stronger self-regulation than males [21].

The present study is not without limitations. First of all, it was conducted at Family Medicine Department, Prince Sultan Military Medical City (PSMMC), Riyadh which could impact the ability to generalize our findings over other departments and institutions. Second, self-reported nature of data collection technique is subjected to bias. Finally, relatively small sample size could affect the power of statistical test to determine significant association between variables. Despite of those limitations, the study is important to assess the perception of trainers rather than trainees towards advantages and disadvantages of virtual learning in Saudi Arabia.

Conclusion

A considerable proportion of family medicine trainers expressed negative attitude towards virtual learning; particularly females and older trainers (>45 years old). Majority of the trainers had an access to a device for teaching online; particularly females. About one-quarter of the trainers described their experience in teaching residents from home as excellent compared to that of teaching at hospital. Most of the trainers agreed that their residents' learning were as much during COVID-19 as they were before switching to virtual learning; particularly male trainers.

Recommendations

According to the present study's findings, the following are recommended:

- Organizing training activities for residency programs' trainers as regards efficient use of virtual learning techniques.
- Hospitals should offer the needed resources for trainers to teach from their homes.
- Teaching communication skills for trainers to help them to contact efficiently with trainees through virtual techniques and help them to convert acquired knowledge into practical skill.
- The process of development and evaluation of virtual learning experience should be a continuous one for improvement of the situation.
- There is a need to further search in students' attitudes and satisfaction with virtual education as well as its cost-effectiveness, changes in its availability, and any possible adverse effects.

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