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Evaluating the Effectiveness of Virtual Academy Training in Enhancing Continuous Medical Education for Primary Health Care Physicians in Dubai Health

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Abstract

This study evaluates the effectiveness of a virtual academy training program in enhancing continuous medical education for family medicine physicians in Dubai, United Arab Emirates. Dubai's primary healthcare sector has implemented this virtual training initiative to provide ongoing education and skill development for family medicine practitioners working in primary care centers. A convergent mixed-methods design combined quantitative survey data from 166 participants with qualitative insights from 27 in-depth interviews. The study examined the impact of the training on physicians' knowledge, clinical competence, overall satisfaction, and the key challenges and opportunities in implementing virtual programs. Results showed that 88% agreed that the sessions improved their awareness of the latest practices, and 72.5% were more confident in diagnosing and treating common illnesses. 85.5% reported successfully putting the training skills to work at their clinics. Participants also noticed improvement in handling essential procedures, with 81.3% agreeing. Qualitative analysis reinforced these findings, highlighting the importance of interactive, case-based learning and the need for more hands-on opportunities. Barriers identified included time constraints, scheduling conflicts, and limited direct practice opportunities. The findings indicate that virtual CME is an effective strategy for upskilling family medicine physicians in Dubai. Hybrid learning models, protected learning time, and optimised session design can further enhance its impact. These insights offer practical guidance for healthcare policymakers and organisations aiming to strengthen medical education through digital innovation in the UAE and similar contexts.

Keywords: Virtual Academy Training, Continuing Medical Education (CME), Primary Health Care, Family Medicine Physicians, Clinical Competence, Dubai Health.

INTRODUCTION

According to Martinengo *et al.,* (2024), Continuing Medical Education (CME) encompasses any method through which medical professionals continue their education after completing their formal training. CME aims to improve patient care through competent practice and keep medical professionals updated about the latest field advancements (Ritchie *et al.,* 2024). In addition to individual professional development efforts, CME encompasses various educational activities, such as conferences, seminars, symposia, courses, and department-specific meetings. These activities maintain, improve, and enhance a physician's knowledge, skills, performance, and relationships (Mueller *et al.,* 2024).

Virtual training programs offer flexible access to essential educational resources, helping healthcare providers overcome geographical barriers. Family medicine physicians need proficiency in utilising such technologies for patient consultations and diagnostics. For instance, studies have shown that virtual visits can enhance patient-centered care by allowing physicians to manage consultations while maintaining continuity of care effectively (Cheng *et al.,* 2023). This format not

only improves accessibility but also empowers healthcare providers to adapt their practices to current medical challenges and patient needs (Rueda *et al.,* 2023). Furthermore, virtual training models encourage a comprehensive understanding of clinical practices by exposing physicians to diverse methodologies and technologies that may not be part of their traditional education (Ogundiya *et al.,* 2024). Integrating advanced technologies such as augmented reality (AR) and virtual reality (VR) into training has shown potential to enrich learning by simulating practical scenarios without the risks associated with real-life interactions. This approach benefits resource-limited areas, providing access to high-quality educational content (Marsilio *et al.,* 2024).

As frontline providers in primary healthcare, family medicine physicians in Dubai Health play a pivotal role in managing a broad spectrum of patient needs, from chronic disease management to preventive care. Given the city's diverse population and high demand for comprehensive healthcare services, equipping family physicians with advanced training methods is vital.

Research indicates that CME is crucial for improving patient care and the efficiency of healthcare systems (Hilburg *et al.,* 2020; Jumreornvong *et al.,* 2020). The need for innovative approaches, such as virtual training, has become essential due to the increasing demand for flexible, accessible education for busy healthcare professionals. CME programs that leverage technology offer unique opportunities for physicians to stay updated with current medical practices while avoiding the travel and logistical challenges of traditional in-person training (Jumreornvong *et al.,* 2020). The shift to online formats has also led to the development of tailored educational resources that engage learners through interactive components, thus enhancing knowledge retention and application in real-world scenarios (Hilburg *et al.,* 2020; Reis *et al.,* 2022).

Recent systematic reviews and meta-analyses have explored the impact of virtual training on medical education, particularly for primary health care physicians. Virtual patient simulations significantly improve both knowledge and skills compared to traditional methods. A meta-analysis reported a standardised mean difference (SMD) of 0.94 (95% CI 0.62-1.26) for knowledge outcomes and 1.18 (95% CI 0.73-1.63) for skill outcomes, favouring virtual simulations over conventional training.

Virtual reality (VR) shows promise in medical education. A systematic review found that VR training improved post-intervention knowledge scores moderately (SMD 0.44, 95% CI 0.18-0.69) and cognitive skills substantially (SMD 1.12, 95% CI 0.81-1.43). These findings suggest that VR-based training can effectively supplement traditional learning, particularly skills-based training.

Literature illustrates that virtual training not only addresses logistical hurdles but also amplifies the quality of educational content. Programs that incorporate simulation-based approaches or case-based discussions foster an immersive learning experience that closely mimics real-life clinical situations, which is particularly beneficial in family medicine, where patient interaction is pivotal (Chick *et al.,* 2020; Schneider *et al.,* 2021). Furthermore, the integration of virtual and blended learning models can aid in family physicians' professional identity formation, helping them develop necessary competencies within their practice (Ting *et al.,* 2020). This aspect is particularly significant in rural health settings, where educational resources are frequently limited, and innovative strategies can bridge gaps in training (Jiang *et al.,* 2021).

Evidence suggests that virtual formats have enabled timely updates on current medical issues in addressing specific training needs, particularly in rapidly evolving areas such as evidence-based medicine and telehealth practices (Cleland *et al.,* 2020). These educational interventions are crucial for family medicine practitioners who are often patients' first point of contact, thus bearing the responsibility for comprehensive and cost-effective healthcare delivery (Ferrel & Ryan, 2020). Additionally, enhancing collaborative interprofessional education through virtual collaborations can empower family medicine physicians to work more effectively within diverse healthcare teams, fostering a more integrative approach to patient care (Dedeilia *et al.,* 2020).

Despite the remarkable potential of virtual academy training, challenges persist. Many physicians express concerns regarding the adequacy of virtual training in replicating the essential interpersonal skills required in clinical practice (Torda *et al.,* 2020). Additionally, while virtual care has been beneficial, issues related to technology accessibility and patient engagement remain, particularly in more rural settings where infrastructure may not support high-bandwidth applications (Iancu *et al.,* 2020).

Given these factors, this study aims to evaluate the effectiveness of a virtual academy training program in enhancing CME for family medicine physicians in Dubai Health. Specifically, it will assess the impact of virtual training on knowledge acquisition, clinical competence, and physician satisfaction. The study will also explore challenges and opportunities in implementation, offering insights to guide future CME strategies and policy development in the region.

METHODOLOGY

Study Design: The study utilised a mixed-methods approach, integrating both quantitative and qualitative data, to assess the impact of virtual academy training in improving continuous medical education for primary health care physicians in Dubai.

Setting and Location: The study was conducted within Dubai Health facilities, focusing on primary healthcare centers that had introduced virtual CME programs and hospitals from which specialists participated in the educational sessions presented.

Participant Recruitment and De-Identification: Researchers recruited physicians through email and SMS invitations containing an electronic link. Participation was entirely optional, and researchers obtained informed consent. They assigned participants unique identifiers to preserve anonymity and removed all personal information to ensure de-identification.

Sample Size: To determine the appropriate sample size for a study involving 268 primary care doctors in Dubai Health, the researchers aimed for a 95% confidence level, a 5% margin of error, and a population proportion of 50%. Using these parameters, a sample size calculation for a quantitative survey was derived using the formula for sample size estimation for a finite population. The quantitative survey required approximately 159 doctors to participate to ensure statistical significance. For qualitative interviews, the researchers typically selected around 10–15% of the quantitative sample to provide in-depth insights, which meant interviewing about 16–24 doctors. This mixed-method approach enhanced both the generalizability and the contextual richness of the findings.

Data Collection, Scoring, and Storage: Online surveys collected quantitative data. The survey instrument, a modified version of the CME Impact Questionnaire, was used, and it underwent pilot testing with a small group of physicians to ensure clarity and relevance. Researchers scored the survey data using a Likert scale, where participants rated statements about the program's effectiveness, relevance, and impact on their practice from 'Strongly Disagree' to 'Strongly Agree.' The researchers assigned each response a numerical value to quantify participants' perceptions and analysed the scores to identify overall trends.

Researchers collected qualitative data through semi-structured interviews conducted via Zoom. They chose this interview format to enable focused exploration of key themes while allowing participants to elaborate on their experiences. Interviews lasted approximately 20-30 minutes and were audio-recorded with the participants' explicit consent using Zoom's integrated recording feature.

All collected data were de-identified and securely stored on secure servers within the Dubai Health network. Researchers will retain the data for five years after the study concludes to allow for potential follow-up research and securely delete it thereafter.

Data Analysis: Quantitative data were analysed using statistical tools to assess improvements in CME outcomes. Qualitative data from the semi-structured interviews were analysed using the Thematic Analysis Approach. Researchers familiarised themselves with the data, generated initial codes, searched for themes, reviewed themes, defined and named themes, and produced the final report. They used NVivo 12 software to facilitate the coding and organisation of qualitative data. They triangulated findings from quantitative and qualitative analyses to provide a comprehensive picture of the effectiveness of virtual academy training in CME.

Descriptive Statistics: We calculated frequencies, column percentages, and 95% confidence intervals for every survey item. Using cross-tabulations, we summarised age- and gender-specific attendance patterns and response distributions and calculated means ± SD for composite knowledge and satisfaction indices. The demographic profile and session-attendance figures in the Results section illustrate this approach. We conducted all quantitative analyses and created graphics in IBM SPSS Statistics v28, selecting it for its robust routines for complex survey data and its ability to produce publication-ready tables and charts easily. Syntax files are archived for every transformation (coding, index construction, reliability tests, χ^2, t-tests), ensuring full reproducibility. Microsoft Excel 365 was used only for initial data cleaning and simple figure formatting before insertion into the manuscript. These packages provided an integrated, auditable workflow from raw data to final mixed-methods interpretation.

RESULTS

This study aims to evaluate the effectiveness of virtual training, assess participant satisfaction, and identify the difficulties and strengths associated with the program. One hundred sixty-six healthcare professionals took part in the survey.

Most participants were between 26 and 55 years old. One participant (0.6%) was under 25 years, 46 participants (27.7%) were between 26 and 35, 47 participants (28.3%) were aged 36 to 45, and the largest group—73 participants (43.9%)—were between 46 and 55 years old. The research group included 46 males (27.7%) and 120 females (72.3%). There were 18 participants (10.8%) with 0-5 years in healthcare, 28 participants (16.9%) with 6-10 years, 41 participants (24.7%) with 11-15 years, 33 participants (19.9%) with 16-20 years, and 46 participants (27.7%) with 21 years or more. A Bachelor's degree was reported by 34 of the participants (20.5%), followed by 65 (39.2%) with a

Master's degree, 48 (28.9%) with a Doctorate, and 19 (11.4%) with another level of education.

As demonstrated in Figure 1, the number of sessions attended by participants varied, with 27(16.3%) attending each time, 72 (43.4%) attending most of the time, 51(30.7%) only attending occasionally, 11 (6.6%) not attending very often, and 5 (3.0%) attending none of them.

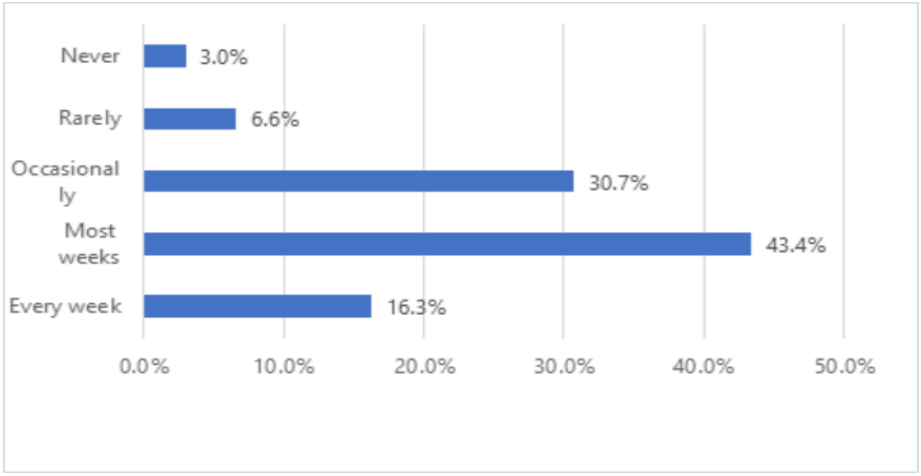

Figure 1: How often do you attend the weekly virtual academy training sessions?

Most participants agreed that their knowledge about modern practices in family medicine had improved. Of the 166 participants, 146 (88%) agreed that the sessions improved their awareness, 4 (2.4%) disagreed, and 16 (9.6%) were neutral (figure 2). The response for each statement was "Agree."

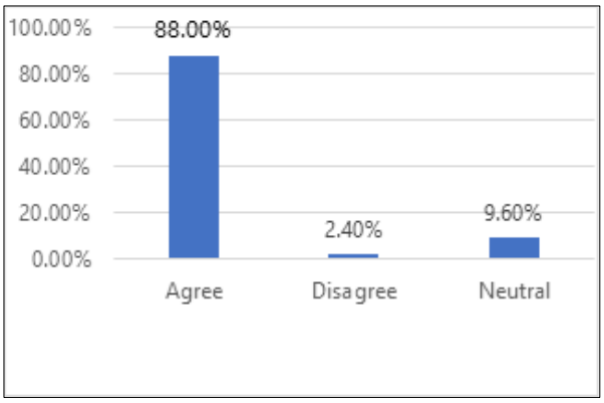

Figure 2: Effect of virtual Academy sessions on awareness of the latest practice

Regarding confidence in making accurate medical diagnoses, about 72.5% of them (n=140) responded that they felt more confident in diagnosing and treating common illnesses. In the same manner, 74.1 (n=143) of the participants said they better understood how to prevent health issues. The percentages of those neutral in each area, with 2.1% (n=4) and 3.6% (n=7) disagreeing, were 9.8% (n=19) respectively. One hundred forty-eight participants (89.2%) agreed that the contents of the training sessions were clear and thorough, 3 (1.8%) disagreed, and 15 (9%) were neutral.

Regarding skill application, 142 participants (85.5%) reported successfully putting the training skills to work at their clinics. Participants also noticed improvement in handling essential procedures, with 135 (81.3%) agreeing, 5 (3%) disagreeing, and 26 (15.7%) not sure. About 72.0% of participants (n=139) agreed that the training made them better at evaluating patients and managing their illnesses. Only 1.6% (n=3) disagreed, while 12.4% (n=24) were neutral.

Most people were happy with the skills they gained through the virtual academy program. Participants responded to significant areas of the virtual academy program with a high level of positive reaction. Specifically, 89.2% (n=148) of respondents positively agreed that the overall curriculum met a high standard, 86.6% (n=144) reported that they could easily follow the training materials, and 84.4% (n=141) indicated that they could navigate the virtual platform with ease.

Figure 3 highlights several challenges to full participation. Most participants (112, 67.5%) reported

difficulty managing their clinical work alongside the virtual training. Slightly more than one-third of participants (66 out of 193) found technical matters like poor internet and software difficulties to be obstacles, as did slightly under half (67), with almost 20% (33) remaining neutral. Also, 85 participants (51.2%) said that having different personal or work-related obligations was a barrier, compared to 38 (22.9%) who disagreed and 43 (25.9%) who were unsure.

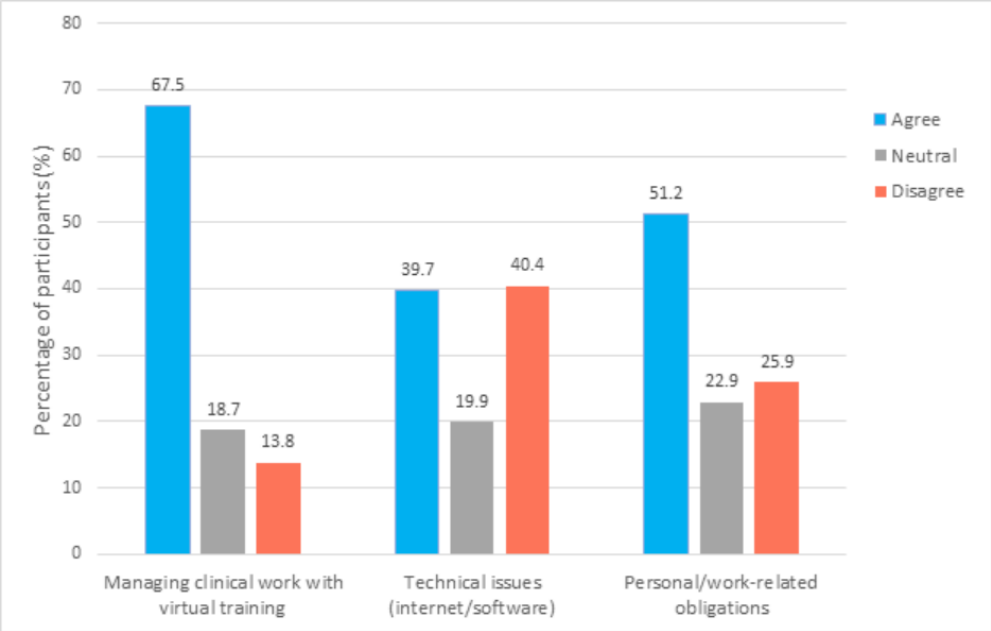

Figure 3: Challenges to full participation in virtual training

People who participated noted several reasons the virtual academy training helped them, including the lectures, speaking with the lecturers, engaging with case studies, and the online platform. All participants said they were satisfied with how the virtual training was organised and presented. Nevertheless, they pointed out that there could be improvements, for example by discussing cases more often and running sessions later in the morning to encourage better attendance. Taking part in virtual sessions seemed easier and more flexible for everyone, mainly due to the higher turnout. Their thoughts included moving sessions to a time that suits everyone, incorporating some live classes for specific topics, and making all recorded sessions accessible online. Survey respondents often mentioned that job duties such as serving multiple patients, being tired from recent overnight shifts, and constant inflows of patients during busy times kept them from participating.

Regarding technical issues, participants did not have to deal with many difficulties; however, scheduling conflicts were still a problem for most. They worked clinically and joined long-distance training, practising their skills in the clinic and attending sessions whenever their work schedule allowed. Participants faced obstacles to participation, including receiving new patient messages and handling clinic duties simultaneously. Some suggestions involved planning class time well, setting up varied session schedules, and handing out recordings so members could watch them later.

DISCUSSION

The thematic analysis of qualitative interviews yielded rich insights into how physicians experienced and perceived the training program. One of the prominent themes was the perceived improvement in knowledge. Participants consistently reported that the virtual training sessions helped them stay updated with recent developments in family medicine. One participant said, 'It enhanced my practice, kept me updated—better patient care and management.

In addition to knowledge enhancement, many physicians indicated they could apply new concepts and skills acquired through the virtual training in their clinical settings. These changes ranged from improvements in diagnostic accuracy and patient consultations to enhanced decision-making in complex scenarios (Hilburg *et al.,* 2020; Jumreornvong *et al.,* 2020). "I saw a patient with short stature and knew exactly which labs to order." Nonetheless, a few respondents noted that the virtual format did not adequately support the development of hands-on clinical skills, pointing to the potential value of blended learning models that incorporate virtual and in-person components (Hedden *et al.,* 2023; Love *et al.,* 2023). We should teach some topics face-to-face.

Satisfaction with the structure and delivery of the virtual academy training was generally high. Participants particularly appreciated the flexibility and

convenience of attending sessions without leaving the workplace or disrupting their clinical duties.

'More convenient for the learner. These advantages align with global trends recognising the value of virtual learning in reducing logistical barriers and improving access to education, especially in high-demand environments such as primary healthcare (Chick *et al.,* 2020; Schneider *et al.,* 2021). However, some physicians felt that the level of engagement varied across sessions, 'Easier to join but more concentration face to face', indicating a need for more consistently interactive teaching methods to maintain learner motivation and participation (Altintop *et al.,* 2022).

Despite the overall positive reception, several barriers to participation emerged. Time constraints due to clinical responsibilities were commonly mentioned, with physicians often struggling to attend sessions regularly or concentrate fully. 'Interfere with patient appointment' when. Technical issues, including internet disruptions and platform-related glitches, occasionally hindered participation. The Internet occasionally disconnects, although not all participants experienced this. A notable limitation cited by many was the absence of face-to-face interaction, which some perceived as detracting from the depth of learning and collegial exchange that traditional CME formats offer (Nishikura *et al.,* 2023).

This study's convergence of qualitative and quantitative findings reinforces the conclusion that virtual training can serve as an effective and scalable strategy for delivering CME in primary care. However, its success depends on thoughtful design, continuous feedback incorporation, and contextual responsiveness. The UAE healthcare context, which demands both excellence in service and efficiency in training delivery, is particularly well-positioned to benefit from such technology-enhanced learning innovations (Cheng *et al.,* 2023).

While the study adds to the growing evidence supporting virtual CME, it is important to acknowledge certain limitations. The reliance on self-reported data introduces subjectivity, and the study's scope within a single healthcare system may limit generalizability. Future research should consider longitudinal designs assessing changes in clinical performance over time and evaluating the impact of blended or adaptive learning approaches. Incorporating objective metrics such as pre- and post-training assessments, patient care outcomes, and peer evaluations could further substantiate the effectiveness of virtual education models.

In conclusion, the virtual academy training program has demonstrated considerable promise in supporting the continuous medical education of primary care physicians in Dubai. The insights gained from this study can inform the refinement of similar initiatives within the UAE and other healthcare systems seeking scalable and effective CME solutions. A balanced approach that leverages the flexibility of virtual learning while addressing its limitations through strategic enhancements will be essential to sustaining its value and impact.

Limitations:

Researchers should consider several limitations when interpreting the results of this study:

- Self-Reported Data: Participants provided the qualitative and quantitative findings through self-assessments, which may introduce biases such as social desirability and recall bias. The study did not include objective measures of clinical improvement.
- Single Institutional Context: Researchers conducted the study within Dubai Health. Although they included physicians from multiple centers, the findings may not fully generalise to other healthcare systems or regions with different infrastructures, cultures, or training models.
- Cross-Sectional Design: Researchers collected the data simultaneously, limiting their ability to determine long-term outcomes or sustained changes in clinical practice.
- Limited Exploration of Patient Outcomes: Although the study captured physicians' perceptions of improved competence, it did not assess whether the virtual training produced measurable improvements in patient care or outcomes.
- Potential Selection Bias: Participation was voluntary, which mageneralisableed in a sample that was more motivated or more positively inclined toward virtual learning, thus possibly skewing the findings toward favourable responses.

Future research should address these limitations through longitudinal designs, incorporating objective performance indicators, and comparisons across different educational modalities. Exploring patient outcomes linked to training and evaluating the cost-effectiveness of virtual CME would also be valuable additions to the evidence base on the effectiveness of virtual CME.

CONCLUSION AND RECOMMENDATION

The findings from this study demonstrate that virtual academy training is an effective modality for delivering continuous medical education to primary healthcare physicians in Dubai Health. Participants perceived substantial improvements in their knowledge, clinical competence, and overall satisfaction with the training program. The virtual format offered flexibility and accessibility that aligned well with the demands of

primary care practice, enabling physicians to stay updated with current medical standards without disrupting their clinical responsibilities.

However, the study also revealed that certain limitations, such as reduced hands-on experience, variable interactivity, and occasional technical or scheduling challenges, may affect the overall learning experience. To maximise the impact of virtual training, healthcare institutions should consider hybrid approaches that incorporate case-based learning, interactive features, and periodic in-person components. Addressing logistical and technological barriers will also be essential in fostering a more inclusive and engaging learning environment.

In conclusion, this study proves that virtual academy training is a valuable and practical approach for continuous medical education among primary healthcare physicians. By addressing current limitations and adopting hybrid, intermaximiseodels, healthcare systems can optimise educational outcomes, support physician competency, and drive sustainable improvements in clinical practice and patient care across the region."

Disclosure

The authors declare that they have no known financial interests, personal relationships, or affiliations that could have influenced the work reported in this paper. This includes, but is not limited to, employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications or registrations, and research grants or other funding. All authors confirm that no conflicts of interest apply.

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