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RESEARCH ARTICLE

COVID-19 ONLINE CROSS-TRAINING PROGRAM

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Abstract

Background:The need for continuity in medical education with the advent of COVID -19, has been highlighted in light of the current global pandemic situation. As the risks posed by COVID -19 must be balanced against the need to care for patients and protect health care workers, cross-training of various health care professions is now more important than ever. In response to the global pandemic and in line with current practice, the Ministry of National Security, King Abdul-Aziz Medical City-Jeddah, has established a cross-training working task force comprising medical educational specialists from various specialtiesto develop an educational platform that includes up-to-date learning resources to provide healthcare professionals with the knowledge they need to treat critical, suspected, and confirmed COVID -19 patients.The main objective of this manuscript is to describe and discuss the implementation process of the cross-training modules. In addition, the manuscript aims to address the knowledge gap related to COVID -19 management by measuring the perceptions of medical students and healthcare professionals.

Methods:A qualitative, descriptive study was conducted in the King Abdul-Aziz Medical City (KAMC) National Guard using the COVID -19 cross-training e-learning platform. The training participants were primarily physicians, then health care workers, students and interns from different universities (KSAU-HS) to be able to treat COVID -19 patients in different areas. This platform was equipped with all the necessary functions to create e-learning training courses. The content of the educational material was to be delivered using two main teaching methods: (1) Virtual learning modules consisting of basic and advanced courses. (2) Simulation-based instruction, consisting of computer-based and simulation manikin-based courses. First, a needs assessment survey was distributed to approximately 150 medical students and health professionals. Then, another self-assessment survey was distributed to approximately 1000 participants.

Results: In the needs assessment survey, the majority of participants (22.3%) were from the Department of Internal Medicine. In the feedback survey, the majority of participants were from the Department of Nursing (15.7%). Overall, participants consider the Cross-Training

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Module/Unit Content & Structure to be adequate in terms of its purpose (P 0.908); results also indicate that participants are satisfied with the provisions (P 0.374) and that the Cross-Training was relevant and helpful to the circumscribed and included professions (P 0.731). **Conclusion:** As synthesis research, this study revealed the perceptions of health professionals and medical students regarding the implementation of an e-learning strategy for cross-training as a teaching tool. Participants indicated that the training program was most helpful because the course materials were strongly tailored to their areas of expertise

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Introduction:-

The need for continuity in medical education has become more important than ever in the current situation of the global pandemic. Considering the need to manage the risks posed by COVID-19, cross-training of different healthcare professionals has now become extremely crucial in order to adequately and effectively fulfill patient needs and protect healthcare workers [1–3]. Therefore, there is an increasedneed to stress the importance of specialized training of healthcare professionals.

In response to these challenging circumstances, several higher educational institutions are attempting to develop new strategies to make learning more effective and viable through e-learning platforms. E-learning is not a new phenomenon, and it has been recently adopted by the higher educational institutes of many developing countries[4,5]. This technology is yet to be uniformlydistributed across all nations [6].

With the uncertainty regarding the end of the pandemic and increased need for online teaching, people all over the world are relying heavily on e-learning, particularly in higher education[7–9]. With the emergence of COVID-19, online teaching has become a new method of assessing medical students, andit is deemed critical in these challenging times that medical students continue to learn [10]. Medical schools and institutions are using a variety of innovative and diverse measures to respond to thispressing issue, including offering online courses with the use of different software and applications for students[11].

In response to the global pandemic and in line with the standard practice, the Ministry of National Guard, King Abdul-Aziz Medical City-Jeddah, has set up a cross-training task force comprising medical educational specialists from various specialties. The group has been tasked with the development of an educational platform that features up-to-date learning resources that can equip healthcare professionals with the knowledge required for the management of suspected, confirmed, and critical COVID patients.

With the numerous executive-led teams in the aforementioned institution, crisis preparedness is the primary goal, with a focus on increasing capacity, both in terms of facilities and trained personnel. Moreover, the COVID Training Committee, which sprung from the COVID Staffing Task Force, has accumulated substantial experience in creating well-structured roadmaps. Furthermore, this effort guarantees that a skilled and competent workforce is available across all disciplines and that an appropriate level of training expertise can be provided, professionally audited, and calibrated using a well-thought-out matrix scorecard.

In every healthcare system, optimizing capacity is the priority. It means that relevant knowledge and skills of the healthcare professionals should be acquired and updated regularly. This becomes especially essential in the midst of a rapidly growing and severe health crisis [1–2,12]. Such a crisis puts operational dynamics under pressure due to increased demand for healthcare. Thus, this initiative will undoubtedly increase the trust, assurance,and confidence of patients in the abilities of the healthcare professionals in the said reputed institution [11].

The primary objective of this manuscript is to describe and discuss the implementation process of cross-training modules that are aimed at(1) building the capacity and skills of healthcare professionals to treat suspected and confirmed COVID patients, (2) identifying the target audience for training, (3) developing focus learning content, (4) formulating an appropriate training methodology, and (5) creating the required assessment tools.

Furthermore, the manuscript aims to close the knowledge gap in terms of COVID-19 management by measuring the perceptions of medical students and healthcare professionals regarding the following parameters: (1) quality of module/unit content and structure of the cross-training program, (2) participants' level of satisfaction with the cross-training program, and (3) relevance of the cross-training program.

Methods:-

Study design and technique

A qualitative descriptive study of the COVID-19 cross-training e-learning platform was conducted at King Abdul-Aziz Medical City (KAMC) National Guard in collaboration with King Saud Bin Abdul-Aziz University for Health Sciences (KSAU-HS). The majority of training participants were physicians, followed by healthcare workers, students, and interns from different colleges at KSAU-HS.

Thisplatform offers a wide range of learning resources that make it a great e-learning platform such as Udemy or Coursera. It has several important features, such as quizzes, questions, certificates, and dashboards that can be used by training centers and educational institutions. Additionally, there are also features required by our course, such as course prerequisites, reports, enabling/disabling features, and the option to add multiple instructions to a single course. The following software, along with their functions, used to create this platform has been presented as follows:

1. PHP: Programming language
2. WordPress: Content management system
3. JavaScript frameworks: React and styled-components
4. jQuery UI and jQuery Migrate and jQuery: JavaScript libraries
5. animate.css: UI frameworks
6. Apache: Web servers

Module development

The COVID-19 cross-training program was devised by a cross-training committee comprising medical educational experts fromdifferent clinical and academic fields. Due to the conditions and restrictions brought about by the global pandemic, educational materials of the platform will be delivered using two major teaching methodologies: (1) virtual learning modules, which consist of basic and advanced courses, and(2) simulation-based education, which consists of computer-and manikins-based simulation courses.

Module content: Virtual learning modules

Course 1 targetsall healthcare workers at KAMC, as well as students and interns from the College of Medicine, Nursing, Applied Medical Sciences, and Dentistry. Course 2 is intended for physicians engaged in the management of critically ill COVID-19 patients in the following clinical areas: adult intensive care, anesthesia, emergency medicine, cardiac care center, general internal medicine, general pediatric, general surgery, pediatric intensive care, and neonatal intensive care.

Course 1: Basic Level (General Knowledge, Infection Control and Prevention Guidelines, and Patients' Journey)

Course 1 is comprised of four modules. Module 1:COVID-19 General Knowledge;Module 2:COVID-19 Infection Control and Prevention Guidelines; Module 3:COVID-19 Patients' Journey.All physicians engaged in the management of COVID-19 patients must undertake these modules. Furthermore, to ensure that the modules are being undertaken, the medical services department shall oversee their dissemination among physicians under the department, while postgraduate medical education is responsible for monitoring trainees and ensuring that they are undertaking the modules.

Module 1 enables physicians to incisively describe the pathophysiology of COVID-19, recognize its mode of transmission, identify its sustainability in different environments and surfaces, describe the mode of testing, and determinethe proper method of obtaining a nasopharyngeal swab test.

Module 2 aims to equip physicians with the knowledge of identifying patients with suspected COVID-19 infection, assessing the degree of urgency (triage) among suspected or confirmed cases to the appropriate location, using personal protective equipment (PPE) in different case encounters, implementing the ICP procedures for exposed healthcare workers, and recognizing procedures for clearance of suspected or confirmed cases.

Lastly, Module 3 is aimed at enabling physicians to identify the different hospital source allocations where suspected or confirmed COVID-19 patients can be found, classify cases based on the severity of patient conditions (adults and pediatric), and determine the suspected/confirmed COVID-19 patients who are eligible for home isolation and those who are eligible for admission to a regular ward or ICU.

Course 2 (Advanced): Approach of Critically Ill COVID-19 Patients (Adult, Pediatric, and Adult &Pediatric Code Blue)

Course 2 encompasses the following: Module 4: Approach to Critically Ill COVID-19 Adult Patients; Module 5:Approach to Critically Ill COVID-19 Pediatric Patients; Module 6: COVID-19 Adult & Pediatric Code Blue.

Module 4 consists of two parts:The first part focuses on various aspects of systematic approach and invasive airway management. It enables physicians to recognize the appropriate approach to critically ill COVID-19 patients, attain knowledge of basic respiratory support and the different oxygen delivery methods available, understand the role of non-invasive ventilation, and understand the indications for intubation in COVID-19 patients. The second part focuses on the aspect ofinvasive mechanical ventilation to adult COVID-19 patients with acute respiratory distress syndrome (ARDS). Itallows physicians to understand the process of diagnosing ARDS in COVID-19 patients, assess the severity of the syndrome, comprehend the basics of the lung protective ventilation strategy, understand sedation and paralysis in the context of suchpatients, learn about the indication of prone positioning, know the PEEP titration strategy, and learn about the rescue measures for severe hypoxemia and other supportive measures.

Module 5 is composed of two parts:The first part focuses on the intubation of COVID-19 pediatric patients. It aims to provide the physician with the knowledge to recognize signs of respiratory failure in COVID-19 pediatric patients, utilize an intubation checklist to organize teams and plan for intubation, conduct rapid sequence intubation (RSI) with minimal exposure to staff, accurately demonstrate how to wear PPE, and perform safe RSI while making proper use of PPE. The second part focuses on invasive mechanical ventilation andARDSin COVID-19 pediatric patients. It enables physicians to assess ARDS severity inpediatric patients, set appropriate ventilation and oxygenation parameters based on phenotype and severity, understand the escalation of therapy and use of adjunct therapy for severe ARDS, titrate the ventilator parameters in order to achieve adequate oxygenation and ventilation, identify basic ventilator waveforms, recognize ventilator troubleshooting, and deliver appropriate care to invasively ventilated patients.

The last module for Course 2 is Module 6. The module aims to teach physicians how to deliver high-quality CPR to patients whilekepping staff protected during the process, andknow the different order of steps for resuscitating COVID-19 patients experiencing cardiac arrest, to provide revision ofthe appropriate airway, electrical shock, as well as medication instructions, and to help them recognize signs of the return of spontaneous circulation (ROSC).

The instructional materials were delivered via online lectures and videos. In the end, the trainees or participants were required to complete a quiz to assess their understanding of each concept and evaluate their overall learning. Before the participant can proceed to undertake the next set of quizzes or activities, they must have answered the questions in the previous quiz correctly. Certification of completion is provided at the end of each module.

Module Content: Simulation-Based Education (SBEs)

KAMC is equipped with simulation centers that can be utilized to achieve training goals. The process of conducting SBEs involves the following: identifying the knowledge gap among trainees, assessing the training tools using recommended social distances, developing simulation scenarios that target pre-defined learning gaps, using free-access computer-based platforms and virtual simulation platforms (Body Interact), utilizing in situ simulation to accommodate a large number of trainees in small groups over time (longitudinal interprofessional education), and implementing rapid cycle deliberate practice (RCDP), whereby learners can repeatedly engage in simulation scenarios until they master a concept. The targeted population for this part of the training included physicians who deal with critically ill patients in the aforementioned departments.

Course 3: Computer-Based Simulation (BODY INTERACT^{TM})

Course 3 is primarily conducted using free-to-access online virtual computer-based platforms such as BODY INTERACT^{TM}, which was developed to teach healthcare providers how to treat COVID-19 patients in various clinical situations. These platforms use computer-based simulations for evaluation, dissemination of knowledge on precautions and PPE, investigation, management, and debriefing in real-time. Computer-based simulation systems

are preferred for the following reasons: relatively lower training costs, virtually limitless simulation of the same training, real-time evaluation of training results, lower likelihood of patient harm, and ease of learning appropriate response behavior in dealing with various medical cases encountered in a hospital. Moreover, it can be used repeatedly for large groups of trainees.

Course 4: Manikin-Based Simulation Education

A particular group of physicians participated in the manikin-based simulationscenarios utilizing intermediate/high-fidelity manikins in situ (ER, ICU, and PICU), where additional training for predetermined crucial skills is required (e.g., protected rapid sequence intubation, aerosol-generating procedures, and so on). Simulation session was assessed using a checklist and rapid cycle deliberate practice (RCDP). RCDP simulationshave been demonstrated to improve the resuscitation performance of traineesby allowing them to practice skills repeatedly while receiving brief interleaved feedback [3, 28].

Study setting and subjects

Initially, the researchers disseminated self-administered surveys to gather information on the content of the program to conduct a pre-need assessment. This survey involved 149 medical students and healthcare workers. Another self-administered feedback survey was conducted after course completion to gather information on the participants' perceptions of the COVID-19 cross-training course. This feedback survey gathered information from approximately 1000 medical students and healthcare workers.

Virtual online courses were uploaded on the website of KSAU-HSCollege of Medicine, Jeddah, through the institution's technical and support (the information technology department) with the provision of URLs. This is implemented to reach all targeted audiences in a timely and efficient manner.

In terms of the action card application, the institute also provides electronic manual cards that include highly retainable information on how to dealwith several critical scenarios, such as the management of hypoxic COVID-19 patients, intubation, ventilation setting, shock state, and communication with team members, as well as the patients' family.

Data management and analyses

The collected data were analyzed using IBM SPSS version 23 IBM SPSS version 23 (IBM Corp., Armonk, N.Y., USA) and visually presented using GraphPad Prism version 8 (GraphPad Software, Inc., San Diego, CA, USA). Simple descriptive statistics were used to define the characteristics of the study variables through counts and percentages for categorical and nominal variables, while continuous variables were presented as means and standard deviations. One-way analysis of variance (ANOVA) was used to compare more than two groups. These tests were performed under the assumption of a normal distribution. Finally, p-value <0.05 was set as the criteria forrejecting the null hypothesis.

Results:-

Table 1 shows the demographic details of the study participants of the pre-need assessment. A total of 149 university medical staff members participated in the survey. Among the participants, the majority (22.3%) belonged to theinternal medicine department, followed by the emergency department (21.6%) and the pediatric department (20.3%). Additionally, the residents who participated in the study were at different levels of residency training. The majority of the residents (29%)were at the R3 level, followed by R2 (25.4%), R1 (19.6%), R4 (18.8%), and R5 (7.2%).

Furthermore, Table 1 shows the study participants' responses regarding the areas and competencies that were needed to be coveredin the course on the management of COVID-19 patients. The majority of the participants'responses pertained to the management and resuscitation of critically ill COVID patients (79.9%), risk stratification and disposition of COVID patients (57.7%), and necessary precautions in this COVID era (56.4%). To supplement this data, subjective inputs and suggestions from participants pertaining to the need for more interventions in COVID-19 management were collected. These include CPR interventions, measures for handling neonates of COVID-19-positive new mothers, provision of mechanical ventilation settings, and a few concerns related to the use of only one N95 mask per shift.

Participant suggestions also include information on taking proper precautions against uncertainties, safely storing and reusing PPE, redeployment plan and reinforced training for all non-EM/ICU residents, improving anticoagulation management, detecting unusual or atypical presentations of COVID, as well as implementing better ways of disseminating information pertaining to updated suspected case precautions (e.g., ER while oncall), among others.

The demographic details of the study participants (969 participants) in the course feedback survey for the COVID-19 cross-training have been summarized in Table 3. Notably, the majority of the participants were from the nursing department (15.7%), followed by the college of medicine (11.8%), the emergency department (8.8%), the respiratory therapist department (6.9%), and the anesthesia department (6.8%). From the feedback survey, it was found that, in terms of the level of the participants, most of them were students (340, 35%), followed bymedical interns (230, 23.8%) and medical staff (144, 14.9%).

Table 4 shows the responses gathered from the participants regarding their perceptions of the unit content and structure of the administered modules. Additionally, the majority of the participants had a positive perception of the training program. Precisely, 55.7% strongly agreed and 41.3% agreed that the objectives of the modules were clearly defined; 53% strongly agreed and 42.2% agreed that the content was organized and easy to follow; 55.3% strongly agreed and 41.2% agreed that sufficient time was allotted to complete the module; lastly, 54.5% strongly agreed and 41.7% agreed that appropriate knowledge was gained from undertaking the modules and simulations.

Table 5 showsthe data (as means and standard deviations) pertaining to the participants' satisfaction level and perceptions of the relevance of the cross-training material. The majority of the respondents expressed their satisfaction with the modules (mean = 4.27, SD = 0.9), and most participants also perceived that the modules were relevant and beneficial to their specialty (mean = 4.25, SD = 0.9).

These findings are further substantiated in Table 6. The tablepresents the overall feedback from participants regarding the cross-training program. In general, the inputs indicate positive participant perception and affirmative commentaries regarding the program. The participants found thatthe modules were clear, informative, educational, easy to understand, well-organized, and were according to international standards. However, they also pointed to a few areasofimprovement, indicating some web-based problems (e.g., slow downloading speed or processing time and concerns regarding accessibility difficulties). Additionally, some participants found the set-up "confusing" and that the instructors were not organized with their teaching strategies. Some respondents also statedthat abbreviations should be introduced more clearly and that the modules appeared to be specifically designed for physicians, nurses, and other hospital healthcare workers, which limited their understanding of the course material. In terms of the duration formodule undertaking, one respondent expressedthat a briefer time allotment could have allowed participants to maintain their concentration levels and,consequently, make good use of thetraining materials.

Table 7 displaysthe synthesized findings of the present study. The findings were related to three major aspects: (1) quality of module/unit content and structure of the cross-training program, (2) participants' level of satisfaction, and (3) relevance of the cross-training program. Each of these aspects was accompanied by their corresponding respondent populations and p-values. Moreover, data from Table 7 provided grounds for the following conclusion: the module/unit content and structure weresufficient and adequate in fulfilling its purpose (p= 0.908); participants weresatisfied with the provisions of the cross-training program (p = 0.374); lastly, the cross-training program was relevant and helpful in the circumscribed and encompassed professions (p= 0.731).

Discussion:-

The abrupt shift from face-to-face classes to online teaching with the advent of COVID-19 has revolutionized higher education in all areas, especially medical education. In the past, e-learning has been underused, particularly in developing nations [13–15]. However, the present COVID-19 era has compelled the whole globe to rely on e-learning for continuing education and professional development [16–19]. Moreover, training programs through simulation -and module-based courses have been devised to further optimize strategies for online learning [20]. In this study, the COVID-19 cross-training program in KAMC was evaluated by conducting pre-need and feedback surveys.

The pre-need surveywas carried out to lay the groundwork for the necessary areas on which researchers would need to focus for designing the prospected cross-training program. The responses gathered from the participants were

primarily related to the management and resuscitation of COVID patients. This principle was also employed by Upadhyay and Wadkin[21]in their 2021 study of the UK trainees' perceptions of the Radiology-Integrated Training Initiative (R-ITI) e-learning platform. In their study, amongthe many considerations regarding the design of e-modules, the learning areas deemed relevant to the trainees' line of practice were also included.

Moreover, the survey allowed the researchers to make several considerations regarding course delivery and requirements in order to ensure that the training program is in line with its objectives. This is the same consideration that was adopted by McDonald et al. [22]in their study, wherein the initial program set was revised from 15-week to 7-week duration.

Appropriately, healthcare professionals from departments the most in demand with the surge in the number of COVID-19 patients and those in need of cross-training were included in the feedback survey. With the inclusion of a diverse group of medical and healthcare professionals, including medical consultants, faculties, interns, residents, staff, and students and from their responses, it was found that medical consultants found the training program to be the most helpful, as the course materials were more heavily catered toward their area of practice.

From participant evaluation of the module or unit content structure, it was revealed that, generally, medical students and healthcare professionals were able to attain appropriate knowledge from the training program.

The participants also found that the objectives of the moduleswere clearly defined and that the content was organized and easy to follow. This finding is consistent with those of Chapman et al.[23],which used a similar evaluation survey. In their study, the majority of the respondents confirmed the relevance of the content of the case-based modules and other reference materials. The findings of the current study also revealed that sufficient time was allotted for completing all the modules. However, some of the respondentssuggested that improvements need to be made with regard to time management.

With regard to the level of participant satisfaction and relevance of the cross-training program, the findings revealed a largely positive perception of the training program, in that the medical students and healthcare professionals in KAMC found the program highly acceptable and relevant to their practice. A similar finding was achieved in Camargo et al. [24], where it was revealed that e-learning for university-level programs was largely accepted and viewed in apositive light by both the program directors and students of an institute in the Midwest.

However, this finding contradicts those of Rauch et al.[25] and Uzzaman et al.[26]. In both these studies, with regard to acceptance, relatively fewer participants approved of online learning and thought that the online learning platform needed further improvement. However, this is subject to further analysis, considering the differences in the variables used.

Nonetheless, in this study, there were also areas of improvement with regard to the content, as suggested by a few participants. These include the need to devise two separate courses, one for physicians dealing with adult patients and the other forthose involved in pediatric and neonatal care. Further elaborations regarding the management of the pregnant population have also been presented in this study. Moreover, instructor-related concerns affected the overall learning of participants. This result is consistent with the findings of Swaminathan et al.[27], who found that the ability of the educator to make good use of technical tools is a major contributor to the proper implementation of online modules.

However, the present study had one limitation. This was a cross-sectional study, and as such, it analyzed the perceptions of participants in KAMC at a certain point in time. Thus, a longitudinal study is needed to capture the change in the perceptions of the participants as a result of certain uncontrollable factors in order to determine the factors that influence the adoption of e-learning platforms on a broader scale.

Conclusion:-

As synthesis research, this study revealed the perception of several healthcare professionals and medical students with regard to the adoption of a cross-training e-learning strategy as a teaching tool. The study findings showed that the training program was perceived as highly acceptable by the participants, who stated ease of use as one of itsmain advantages. From the participant responses, it was found that medical consultants, among all the participant groups, found the training program to be the most helpful since the course materials were heavily catered toward their

specialties. However, they highlighted a few minor technical issues as the most significant barriers to e-learning acceptance. Participant demographics also appeared to be important factors in the acceptance of e-learning.

The study findingsmight provide further avenues forresearch and investigation of the development and implementation of even more reinforced and strategic e-learning training programs for healthcare professionals.

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Table 1:- Baseline characteristics of the participants of the pre-need assessment survey & areas and competencies covered.

Variables		**Count**	**%**
Total		149	100.0
Your department	Anesthesia Department	22	14.9
	Cardiology Department	3	2.0
	Emergency Department	32	21.6
	General Surgery	6	4.1
	Intensive Care unit	18	12.2
	Internal Medicine Department	33	22.3
	Pediatric Department	30	20.3
	Pediatric Intensive care	3	2.0
	Thoracic	1	.7
	Missing	1	
Your Level	Assistant consultant	1	.7
	Consultant	1	.7
	Fellow	9	6.0
	Resident	138	92.6
If you are a Resident		**Count**	**%**
Total		138	100.0
What is your level?	R1	27	19.6
	R2	35	25.4
	R3	40	29.0
	R4	26	18.8
	R5	10	7.2
Which competencies/areas of managing COVID patients do you need to cover the most?		**Count**	**%**
Total		149	100.0
Diagnosis and Recognition of COVID		64	43.0
Management and Resuscitation of sick COVID patients		119	79.9
Mental wellness		52	34.9
Quarantine and anxiety		52	34.9
Necessary Precautions in this COVID era		84	56.4
Strategies for low resource's setting		68	45.6
Risk stratification and Disposition of COVID patients		86	57.7
Pathophysiology of COVID		32	21.5
ARDS mechanical ventilation and supportive care		1	0.7

Table 2:- Corresponding departments of the participants of the COVID-19 cross-training course feedback survey.

Variables	**Count**	**%**

Total		969	100.0
Your department	Administrative Support	2	0.2
	Adult Medical Oncology department	5	0.5
	Anesthesia Department	66	6.8
	Cardiac Surgery	1	0.1
	Cardiology Department	19	2.0
	Clinical Laboratory Department	14	1.4
	Clinical Laboratory Student	3	0.3
	Clinical Nutrition	33	3.4
	Clinical Pharmacy	11	1.1
	Clinical Pharmacy student	2	0.2
	Collage of Dentistry	13	1.3
	Collage of Medicine	114	11.8
	College of Nursing	2	0.2
	Dental Department	44	4.5
	Dermatology	1	0.1
	Emergency Department	85	8.8
	EMS	32	3.3
	ENT	1	0.1
	Family Medicine	25	2.6
	General Surgery Department	11	1.1
	Home health care	1	0.1
	Intensive Care unit	9	0.9
	Internal Medicine Department	24	2.5
	Medical Intern	47	4.9
	NA	1	0.1
	Neurosurgery	3	0.3
	Nursing	152	15.7
	OBGYN	11	1.1
	Occupational Therapist	20	2.1
	Oral radiology	2	0.2
	Orthopedic Surgery	7	0.7
	Palliative Medicine	1	0.1
	Pathology	1	0.1
	Pediatric Department	43	4.4
	Pediatric Hematology Oncology Department	4	0.4
	Pediatric Intensive care	15	1.5
	Physical therapist	8	0.8
	Prosthodontic Department	4	0.4
	Radiology department	32	3.3
	Radiology Therapy	2	0.2
	Respiratory Therapist	67	6.9
	Respiratory Therapist Student	5	0.5
	Rheumatology and Rehabilitation	3	0.3
	Sociologist	1	0.1
	Specialist Laboratory	1	0.1
	Staff Faculty	21	2.2

EMS: Emergency Medical Services; ENT, Ear, Nose, And Throat.

Table 3:- Baseline characteristics of the participants of the COVID-19 cross-training course feedback survey

Variables		**Count**	**%**
Total		969	100
Your Level	Admin Assistant	1	0.1
	Anesthesia technologist	1	0.1
	Assistant	1	0.1
	Assistant Consultant	6	0.6
	Assistant Professor	2	0.2
	Clinical Cardiac Perfusionist	1	0.1
	Clinical Pharmacy student	1	0.1
	Consultant	68	7
	Dental assistant	1	0.1
	Dental Intern	1	0.1
	EMS	1	0.1
	Faculty	10	1
	Fellow	37	3.8
	General Dentist	1	0.1
	General Practice	1	0.1
	Graduated	4	0.4
	Intern	229	23.7
	Nursing	1	0.1
	Professor	2	0.2
	Resident	122	12.6
	Staff	137	14.2
	Student	330	34.1
	Teacher	3	0.3
	Teacher Assistant	4	0.4
	Trainee	3	0.3
	Missing	1	
Your Level	Consultant	105	10.8
	Faculty	27	2.8
	Intern	230	23.8
	Resident	122	12.6
	Staff	144	14.9
	Student	340	35.1
	Missing	1	
If you are a Resident,		**Count**	**%**
Total		122	100
What is your level?	R1	36	34.3
	R2	15	14.3
	R3	18	17.1
	R4	25	23.8
	R5	11	10.5
	Missing	17	

EMS: Emergency Medical Services; R, Resident Training Level.

Table 4:- Participant evaluations on the COVID-19 cross-training platform (module/unit content structure).

Module/Unit Content & Structure		**Count**	**%**
Total		969	100
The objectives of the module were clearly defined.	Strongly Disagree	16	1.7
	Disagree	13	1.3
	Agree	400	41.3
	Strongly Agree	540	55.7

The content was organized and easy to follow.	Strongly Disagree	19		2	
	Disagree	27		2.8	
	Agree	409		42.2	
	Strongly Agree	514		53	
Sufficient time was allowed for this module	Strongly Disagree	18		1.9	
	Disagree	16		1.7	
	Agree	399		41.2	
	Strongly Agree	536		55.3	
Appropriate knowledge was gained	Strongly Disagree	18		1.9	
	Disagree	19		2	
	Agree	404		41.7	
	Strongly Agree	528		54.5	
	N	**Min**	**Max**	**Mean**	**SD**
The objectives of the module were clearly defined.	969	1	4	3.51	0.6
The content was organized and easy to follow.	969	1	4	3.46	0.6
Sufficient time was allowed for this module	969	1	4	3.50	0.6
Appropriate knowledge was gained	969	1	4	3.49	0.6
Module/Unit Content & Structure Score	969	1.00	4.00	3.49	0.6

Table 5:- Participant evaluations on the COVID-19 cross-training platform (satisfaction and relevance).

Variables	**N**	**Min**	**Max**	**Mean**	**SD**
How satisfied were you with the module?	969	1	5	4.27	0.9
How relevant and helpful do you think it was for your specialty?	969	1	5	4.25	0.9
		Count		**%**	
Total		969		100.0	
How satisfied were you with the module?	1	13		1.3	
	2	22		2.3	
	3	161		16.6	
	4	267		27.6	
	5	506		52.2	
How relevant and helpful do you think it was for your specialty?	1	13		1.3	
	2	29		3.0	
	3	171		17.6	
	4	243		25.1	
	5	513		52.9	

Table 6:- Participants' overall feedback on the COVID-19 cross-training platform.

Variables		**Count**	**%**
Total		969	100.0
Any overall feedback for the module?	9/10	1	.1
	Above expectations	1	.1
	All is perfectly clear	1	.1
	Amazing	4	.4
	An excellent work	1	.1
	Better introduce abbreviations more clearly	1	.1
	Briefer time for each lecture to keep more concentration	1	.1
	Clear and Easy to understand	1	.1
	clear and perfect	1	.1
	Designed for physicians or nurses/hospital HCW only	1	.1
	Educative	2	.2
	Excellent	21	2.2
	Good	50	5.2
	Great	9	.9
	Hard to access	3	.3

	Helpful	5	.5
	Informative	2	.2
	International standardized courses - well organized	1	.1
	It is mandatory for every healthcare worker and students.	1	.1
	It is very good and hopeful specially staff wellbeing	1	.1
	It was clear for me	1	.1
	It was good and informative	1	.1
	It was great and beneficial thank you	1	.1
	It was useful.	1	.1
	Learning more information about coronavirus	1	.1
	Module was informative but too many web-based problems.	1	.1
	Needs more organization	1	.1
	Nice	7	.7
	None	64	6.6
	Please write the MCQs in proper format	1	.1
	Satisfied	2	.2
	Simple easy, not take A lot of time to do it	1	.1
	Thank you	22	2.3
	The presenter is bad	1	.1
	Valuable knowledge/information	2	.2
	Very beneficial	1	.1
	Very Clear and well based information	1	.1
	Very Conclusive	2	.2
	Very cooperative	2	.2
	Very good	12	1.2
	Very useful/Helpful	10	1.0
	Well organized and informative	1	.1
	Yes	1	.1

Table 7:- P-values of participant evaluation on the COVID-19 cross-training platform.

Your Level	**Total**	**Module/Unit Content & Structure Score**	**p-value**	**How satisfied were you with the module?**	**p-value**	**How relevant and helpful do you think it was for your specialty?**	**p-value**
Consultant	105	3.48 ± 0.6	0.908	4.24 ± 0.9	0.374	4.15 ± 1.0	0.731
Faculty	27	3.56 ± 0.5		4.22 ± 0.9		4.11 ± 1.1	
Intern	230	3.50 ± 0.6		4.34 ± 0.8		4.26 ± 0.9	
Resident	122	3.45 ± 0.6		4.18 ± 0.9		4.28 ± 0.9	
Staff	144	3.52 ± 0.5		4.17 ± 1.0		4.22 ± 0.9	
Student	340	3.48 ± 0.6		4.31 ± 0.9		4.29 ± 1.0	

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