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Capacity Building for Research in Critical Care: A Pilot Program in the Eastern Mediterranean Region

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Research productivity in the Eastern Mediterranean Region is relatively low in all fields, including critical care. We describe a capacity-building research program that was piloted with 11 clinicians from the Eastern Mediterranean Region, who had minimal research experience. The program was conducted over 1 year, with a structure that specifically addressed factors that contribute to low research productivity. We describe the structure of the program, the faculty involved, the feasibility, and challenges faced, as well as the impact of the program on research output. At a small scale, the program was generally feasible and demonstrated promising results. Evaluating the feasibility of conducting such a program over a longer period of time and with a larger group of participants is necessary since research capacity-building programs require multiple years to demonstrate a significant impact on research output.

KEY WORDS: capacity building; critical care; Eastern Mediterranean; research productivity; research; training

To the Editor:

Research is essential for effective clinical decision-making and for improving the quality of patient care. Although the Eastern Mediterranean region (EMR) has made significant advances in healthcare, the proportion of resources allocated to research and the research output is generally low in all fields, including critical care (1–3).

Several factors contribute to this low research productivity, which include lack of training in clinical research resulting in poor research skills, deficiency of local mentors, minimal financial resources, as well as lack of language proficiency and suboptimal writing skills being obstacles to publication in peer-reviewed journals (4, 5). In this letter, we present a capacity-building program for research in critical care that was developed and piloted by the Middle East Critical Care Assembly, a nonprofit organization that was present at the time of developing the program and aimed to promote research and professional development among critical care practitioners in the EMR. We aim to describe the structure of the program, the faculty involved, the feasibility and challenges faced, as well as the impact of the program on research output.

DESCRIPTION OF RESEARCH PROGRAM

Eligibility

Eligible candidates were healthcare professionals practicing in the EMR, with minimal experience in research. Applicants were required to submit a one to

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two page personal statement that described their interest in clinical research and a proposed research idea, along with a letter of support from their director/supervisor. Research ideas eligible for this program were those that could be completed at the participant's institution within 4–6 months. Clinical interventional studies as well as multicenter studies were discouraged since the time required to plan for, and implementing such studies would typically exceed the 1-year timeframe of the program.

Structure and Faculty

This was a 1-year, multidisciplinary, structured, mentor-based program. The main goal of this program was to improve the research knowledge and skills as well as enhance critical care research productivity among practitioners in the EMR. The program faculty consisted of nine clinical instructors with extensive experience in critical care research (among whom six were research mentors), a biostatistician, and a medical editor. The research mentors were involved throughout the program, whereas others contributed to specific parts of the program.

Each participant was required to develop and conduct a research project at his/her local institution, as well as complete the research abstract and article. The program started with a research proposal workshop and ended with an article-writing workshop. Monthly webinars were conducted during which various research-related topics were presented, such as data analysis, data cleaning, preparing and presenting abstracts, and article writing. In addition, participants had meetings with the program director to discuss the status of their research projects and address any obstacles to their progress.

The research proposal workshop was conducted over 2 days in Jordan. The main goal was for participants to complete the proposal for the research idea that they had initially identified. **Table 1** briefly outlines the faculty involved and the content of this workshop. Following the workshop, each participant was assigned a mentor throughout the program to provide guidance and support in developing and conducting the research project. Since the mentors and mentees were in different countries, they communicated through emails and online meetings.

The article-writing workshop was conducted over two and a half days in Jordan. Participants were required to have their initial draft of the article completed prior to the workshop. The main aim was for participants to complete the final draft of their research article in a format that is ready for submission. Participants were divided into groups of three to four, with one clinical instructor for each group who discussed each section of the participants' articles. The medical editor rotated between the groups and had 1:1 meetings with each participant to improve their article-writing skills. In addition, once the final draft was completed, the medical editor completed final editing of the article prior to submission. Table 1 briefly outlines the faculty involved and the content of the article-writing workshop.

At the end of the program, participants were asked to complete an evaluation form to determine their level of satisfaction with the content and structure of the program and the impact of the program on their research skills.

Program Outcomes

We received a total of 12 applications that were reviewed by the program director. All applicants met the eligibility criteria and were accepted, but one person withdrew. The program was conducted between October 2016 and September 2017, with five pharmacists and six physicians who had minimal research experience and represented five countries (Jordan, Saudi Arabia, Egypt, Sudan, and Oman). **Table 2** outlines the outcomes of the program in regard to the research projects, abstracts, and articles.

By the end of the program, seven research projects were completed, one was still ongoing, and three were stopped prior to completion due to work-related commitments. The abstracts for all seven projects were completed and presented to the group at the article-writing workshop. Among those abstracts, three were presented at critical care conferences, whereas the remaining could not be submitted to conferences mainly due to lack of financial support.

Following the article-writing workshop, five articles were completed and submitted, one was still in-progress, and one was terminated prior to completion. Two years after ending the program, there have been two articles published (6, 7).

The program evaluation was completed by all participants. The participants reported being satisfied with the content and structure of the program and agreed that it improved their research skills and the quality of their research. The main limitation was the

time necessary to complete the requirements of research once they returned to their practice sites.

Feasibility and Challenges

Overall, the program was considered feasible in terms of the implementation of the various program-related activities, recruiting faculty and mentors, and following up with the participants on their progress. As for the financial part, the program expenses were mostly covered by funds from the Middle East Critical Care Assembly and the program registration fees. All faculty involved in the program volunteered their time, except for the medical editor who was compensated

TABLE 1.
Faculty and Topics Covered at the Program Workshops

Research Proposal Workshop	Article-Writing Workshop
Faculty	**Faculty**
Research instructors ($n = 4$)	Research instructors ($n = 4$)
Biostatistician ($n = 1$)	Medical editor/writer ($n = 1$)
Day 1	**Day 1**
Importance of clinical research Status of research in the Eastern Mediterranean Region	Practical tips on presenting your conference poster
Ethics of research The Institutional Review Board process	Poster presentations Participants present their research posters over 5 min, followed by questions and eedback from the other participants and instructors
Elements of a research proposal The research question, hypothesis, and objectives Defining the rational for your research	Practical tips on medical writing`
Individual work Formulate your own research question and describe your rational	Small group discussion Journal Selection, Title, Abstract, Keywords
Small group discussion Briefly present your research question/ rational	Small group discussion Introduction
Research Methodology Designing and conducting survey research Individual work Complete your research objective, research design, methods, endpoints, and target patient population. Small group discussion Participants present their research objectives and methods	Individual work Revise abstract and introduction sections of the article based on feedback received during the group discussions.

(*Continued*)

TABLE 1. (*Continued*).
Faculty and Topics Covered for the Program Workshops

Research Proposal Workshop	Article-Writing Workshop
Day 2	**Day 2**
Data collection and analysis	Small group discussion Materials and methods
Small group discussion Discuss your statistical analysis plan with the biostatistician for feedback.	Small group discussion Results
Individual work Complete study proposal and prepare brief presentation.	Individual work Revise methods and results sections of the article based on feedback received during the group discussions
Small group discussion Research proposal presentations	Small group discussion Discussion, Acknowledgment, and References
Research limitations	**Day 3**
Determining your study co-investigators	The submission and publication process
Roles and responsibilities of the principle investigator and co-investigators.	
Determining authorship	
	Individual work Revise the article based on the feedback received from clinical instructors and medical editor

for the 3 days she spent at the workshop. The majority of the expenses came from conducting the two workshops, which included venue, meals, and faculty travel and accommodation. However, for capacity-building programs at a regional level, assessing the feasibility of conducting such a program over a longer period of time and with a larger group of participants is necessary.

Several challenges were identified, which affected the ability to complete certain requirements of the program. The first was related to the completion of the study proposal in the first workshop. For novice researchers, identifying an important and feasible research question that is publishable may not be easy. Although the participants had discussed their research ideas in a group online meeting prior to the workshop, new research ideas had to be identified during the workshop for a few participants. Those participants left the workshop without completing their study proposal, which affected the completion of other aspects of the program.

We had anticipated the time necessary for research approval to be around 4–6 weeks from the submission of the protocols. However, there were certain local logistical issues that were not accounted for in the program schedule such as extensive time required for approval from the institutional review board, departmental approvals, and revisions from coinvestigators. Additionally, the time required to complete the research extended beyond the timeline set for the projects due to the participants' clinical responsibilities.

TABLE 2.
Research Outcomes Associated With the Program

Research Outcomes	No. of Participants
Research project by the end of the program	
Completed	7
In-progress	1
Stopped	3
Abstracts	
Completed	7
Presented at conference	3
Evaluation of empiric antimicrobial therapy in ICU patients with severe sepsis and septic shock, presented at the European Society of Critical Care Medicine 2019 annual congress	
Evaluating the impact of pharmacist intervention on medication error rates in ICU patients, presented at the Society of Critical Care Medicine 2018 annual congress	
Quality of life using EQ-5D-3L measure before ICU admission to predict the mortality of critically ill cancer patients, presented at the International Society of for pharmacoeconomics and outcomes research 2018 annual conference	
Articles	
Completed	5
Published (6, 7)	2

Although participants had letters of support from their directors/supervisors, they were all practicing clinicians who had minimal research-protected time.

Two participants had difficulties covering the travel cost for the workshops and the Middle East Critical Care Assembly provided financial support to those participants. The financial support was also a limiting factor with regard to abstract presentations. However, with the current situation of virtual conferences, abstract presentations may be more feasible.

DISCUSSION

In this letter, we describe a clinical research training program that aimed to increase research productivity in the EMR. The program addressed three major factors that contribute to low research productivity in developing countries, which include the following: lack of research knowledge and skills, lack of mentorship, and poor preparation of articles (4, 5). This was a pilot program and therefore included a relatively small number of participants. Nevertheless, it describes a model with promising outcomes and unique elements that may be incorporated into future capacity-building programs.

The program included two on-site workshops that required the travel of participants and instructors. Although the face-to-face meetings have some advantages over the virtual activities, the on-site meetings contributed to most of the cost of the program and were a reason for the inability of some participants and faculty to attend. Conducting virtual workshops may be an option to consider with capacity-building programs conducted at a regional level to increase the feasibility of such a program at a larger scale and improve accessibility to mentors and instructors. We recently piloted the article-writing workshop in a virtual format and found it generally as effective as the face-to-face meetings in terms of meeting the required objectives and outcomes.

An important component of this program was having the participants conduct their research project at their local institutions. This helped participants better understand the research process and the application at their local settings. In addition, having an assigned accomplished research mentor whom the participants could contact for any questions or guidance helped them to address any issues they faced.

A unique aspect of the program was the inclusion of a biostatistician and medical editor with the faculty. Including a biostatistician in the proposal-writing workshop helped the participants understand data analysis and determine the most appropriate statistical tests and analysis to include in their research proposals. However, the biostatistician did not provide support throughout the program, which we realized was

a limitation, since most participants did not have biostatisticians at their institutions and therefore had difficulties with data analysis.

The goal of including a medical editor was to enhance the writing skills of the participants, which is considered as one of the major obstacles to publication among researchers in whom English is not their native language. Although we could have sent articles for medical editing once they were completed, the goal was for the participants to learn how to improve their scientific writing by having group and 1:1 discussions with the medical editor who explained how to improve the content and structure of each article.

Several research capacity-building programs conducted in developing countries have been described but few have evaluated the impact of such programs on research output. In a program conducted by the American Thoracic Society over about 10 years, 64% of the participants had published a medical paper and 79% had presented at scientific academic meetings (8). In a capacity-building program conducted in Pakistan over 7 years, 83% of the completed study projects were published (9). Furthermore, in a program conducted by the National Health, Lung, and Blood Institute in collaboration with several Centers of Excellence, over the 5-year duration, early stage investigators from low-middle income countries had more than 90 publications (including nine articles) and participated in 123 presentations (including lectures, poster sessions, and panel discussions) (10). Although our program included several elements similar to what these programs had, the programs were conducted over a relatively long duration, which we believe is necessary to see a significant impact on research output in capacity-building programs.

In summary, a structured, mentor-based research-training program targeting major elements contributing to low research productivity was feasible and demonstrated promising results in a group of clinicians with minimal research experience. Larger programs that extend over several years are necessary to demonstrate a significant impact on research output.

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