Short communication

Implementation of a mentored professional development programme in laboratory leadership and management in the Middle East and North Africa

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تنفيذ برنامج للتطوير المهني بالتوجيه في مجال قيادة وإدارة المختبرات في الشرق الأوسط وأفريقيا

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الخلاصة: تحتاج المختبرات لقادة يمكنهم الانتفاع مما فيها من موارد بفعالية، وتعظيم قدراتها لأقصى قدر يتيح كشف الأمراض، ويدافعون عنها في بيئة متقلبة للرعاية الصحية. ولتلبية هذه الحاجة، أنشأت جامعة واشنطن في الولايات المتحدة الأمريكية برنامجاً لنيل شهادة القيادة والإدارة للمختبرات بالشراكة مع المكتب الإقليمي لشرق المتوسط لمنظمة الصحة العالمية، وفي عام 2014 تم تنفيذ البرنامج الذي ضم 17 مشاركاً و 11 موجِّهاً ينتمون إلى المختبرات السريرية ومختبرات الصحة العامة في 10 بلدان (مصر والعراق والأردن ولبنان والمغرب وعُمان وباكستان وقطر والمملكة العربية السعودية واليمن). وانطلاقاً من كون البرنامج قد تم تصميمه لتعليم المشرفين على المختبرات مهارات القيادة والإدارة، فقد وفّر البرنامج للمشاركين فيه إمكانية تحسين جودة الاختبارات والعمليات. ولقد كان البرنامج ناجحاً على وجه الإجمال، فقد أكمل ٪80 من المشاركين مشاركتهم به، وأحدثوا تغييرات ذات مردود ملحوظ في المختبرات التي يعملون فيها. ويبدو نجاح البرنامج مشجعاً ويمكن أن يكون نموذجاً لتطوير المزيد من القدرات في المختبرات في الإقليم.

ABSTRACT Laboratories need leaders who can effectively utilize the laboratories' resources, maximize the laboratories' capacity to detect disease, and advocate for laboratories in a fluctuating health care environment. To address this need, the University of Washington, USA, created the Certificate Program in Laboratory Leadership and Management in partnership with WHO Regional Office for the Eastern Mediterranean, and implemented it with 17 participants and 11 mentors from clinical and public health laboratories in 10 countries (Egypt, Iraq, Jordan, Lebanon, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, and Yemen) in 2014. Designed to teach leadership and management skills to laboratory supervisors, the programme enabled participants to improve laboratory testing quality and operations. The programme was successful overall, with 80% of participants completing it and making impactful changes in their laboratories. This success is encouraging and could serve as a model to further strengthen laboratory capacity in the Region.

Mise en œuvre d'un programme de mentorat en développement professionnel pour les directeurs et les cadres de laboratoire au Moyen-Orient et en Afrique du Nord

RÉSUMÉ Les laboratoires ont besoin de directeurs à même d'utiliser les ressources internes de façon efficace, de maximiser leurs capacités à dépister les maladies, et d'œuvrer pour le bien de ces établissements dans un environment de soins de santé en perpétuel changement. Pour répondre à ces besoins, l'Université de Washington (États-Unis), en partenariat avec le Bureau régional de l'OMS pour la Méditerranée orientale, a mis au point le Programme de certification en direction et gestion de laboratoire qui a été suivi par 17 participants et 11 mentors issus de laboratoires de santé clinique et publique dans 10 pays (Arabie saoudite, Égypte, Iraq, Jordanie, Liban, Maroc, Oman, Pakistan, Qatar et Yémen) au cours de l'année 2014. Conçu pour former les responsables de laboratoire aux compétences de direction et de gestion, le programme a permis aux participants de renforcer la qualité du dépistage et des opérations de leurs laboratoires. Le programme a été une réussite dans l'ensemble puisqu'il a été suivi jusqu'à son terme par 80 % des participants et que ceux-ci ont ensuite pu mettre en place des changements réels dans leurs laboratoires. Ce succès est encourageant et pourrait servir de modèle afin de renforcer davantage encore les capacités des laboratoires dans la Région.

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Received: 14/09/15; accepted: 14/07/16

Introduction

Countries around the world have been implementing the International Health Regulations (IHR) since 2007, requiring all countries to detect, assess, notify, and respond to public health threats (*1–3*). Health laboratories are a key component of this response and quality practice is essential, unfortunately, many countries are falling behind in these capabilities (*3–5*). Laboratories are complex, people-driven systems that require strong leadership and effective management to deliver accurate, timely and reliable test results (*6,7*). Unfortunately, many laboratory leaders have not had formal management training or experience leading organizations (*8–10*). While some training programmes exist, most have been designed for audiences in the United States of America, are proprietary or fee-based, lack formal mentorship, are offered exclusively online without opportunity to meet faculty or fellow participants, and have lacked a curriculum that addresses core competencies (*8,10–18*). While field epidemiology training programmes have been envisioned as a mechanism to deliver laboratory management training, they have historically focused on the laboratory's role in outbreak response and have lacked a structured curriculum in laboratory management and leadership. Additionally, some donors have funded trainings through disease-specific programmes. There remains a global need to strengthen laboratory capacity and quality from a systems approach (*19*).

Because of these gaps, we developed a competency-based, blended-learning, mentored professional development programme in health laboratory leadership and management which can be tailored to local environments and implemented globally. The Certificate Programme in Laboratory Leadership and Management (CPLLM) was designed to strengthen the leadership and management skills of laboratory supervisors with the goal of improving their laboratories' operations (*8,10*) and advancing national and regional progress in disease detection and response, laboratory quality and biosafety and biosecurity.

Methods

Programme design

The CPLLM was structured into an in-person programme orientation and course on laboratory systems, 4 online courses, and the applied Capstone Project (Figure 1). Learning objectives were aligned with key laboratory leadership competencies (*8,10*). Adult learning programmes that include components of work-based training significantly impact attainment of competencies and behaviour change (*20–24*). Accordingly, the CPLLM's Capstone Project component was an individualized opportunity for participants to address areas in their laboratories' operations that needed improvement; expand and apply leadership, management, analytical, and communication skills; and implement principles of continuous quality improvement. Capstone Project assignments reinforced these concepts and were due during breaks in coursework.

Curriculum development

The curriculum for the CPLLM (Figure 1) was developed using adult learning methodologies, and included 1 course delivered in person, 4 online courses [including > 85 recorded lectures and videos, interactive assignments, readings, quizzes, and surveys, all accessible through a learning management system (LMS, Canvas™)] (*20 –23,25*). Each online course lasted 4 weeks (except for Laboratory Leadership and Management, which was 8 weeks) and required 20–25 hours of work. Participants spent 5–6 hours per week on coursework and Capstone Project work.

The Canvas™ learning management system is an internet-based application used for the delivery, administration, monitoring and evaluation of the CPLLM; a University of Washington survey indicated that 79% of users prefer this interface to other learning management systems (*26,27*). Canvas™ was customized for the CPLLM, and was a central gateway where participants and mentors could access all programme content, including reading materials, videos, lectures and links to resources—all organized into modules for easy navigation. Participants could also download all materials for offline viewing. Canvas™ contained robust capabilities for communication and collaboration, including discussion boards, messaging, email, schedule notifications and announcements, and allowed posting of multiple file types, including voice and video. Each online course was led by an instructor and teaching assistant, who monitored participants' assignments, guided online discussions and provided support as needed.

Participant recruitment and selection

To facilitate appropriate candidate recruitment within multiple ministries of health, a detailed profile was developed which described the required experience of participants. The ideal participant would be a director or manager in a public clinical or public health laboratory (mid-career); hold a Bachelor's degree (or equivalent) with > 5 years experience in laboratory medicine, > 1 year in a supervisory role, regarded as an emerging leader with strong motivation for laboratory improvement and self-improvement. Recruitment began in September 2013; 3 candidates from the public sectors in Egypt, 2 each from Iraq, Jordan, Oman, Pakistan, Qatar, Saudi Arabia and Yemen, and 1 each from Lebanon and Morocco were accepted. Selected participants had no previous training in leadership or management.

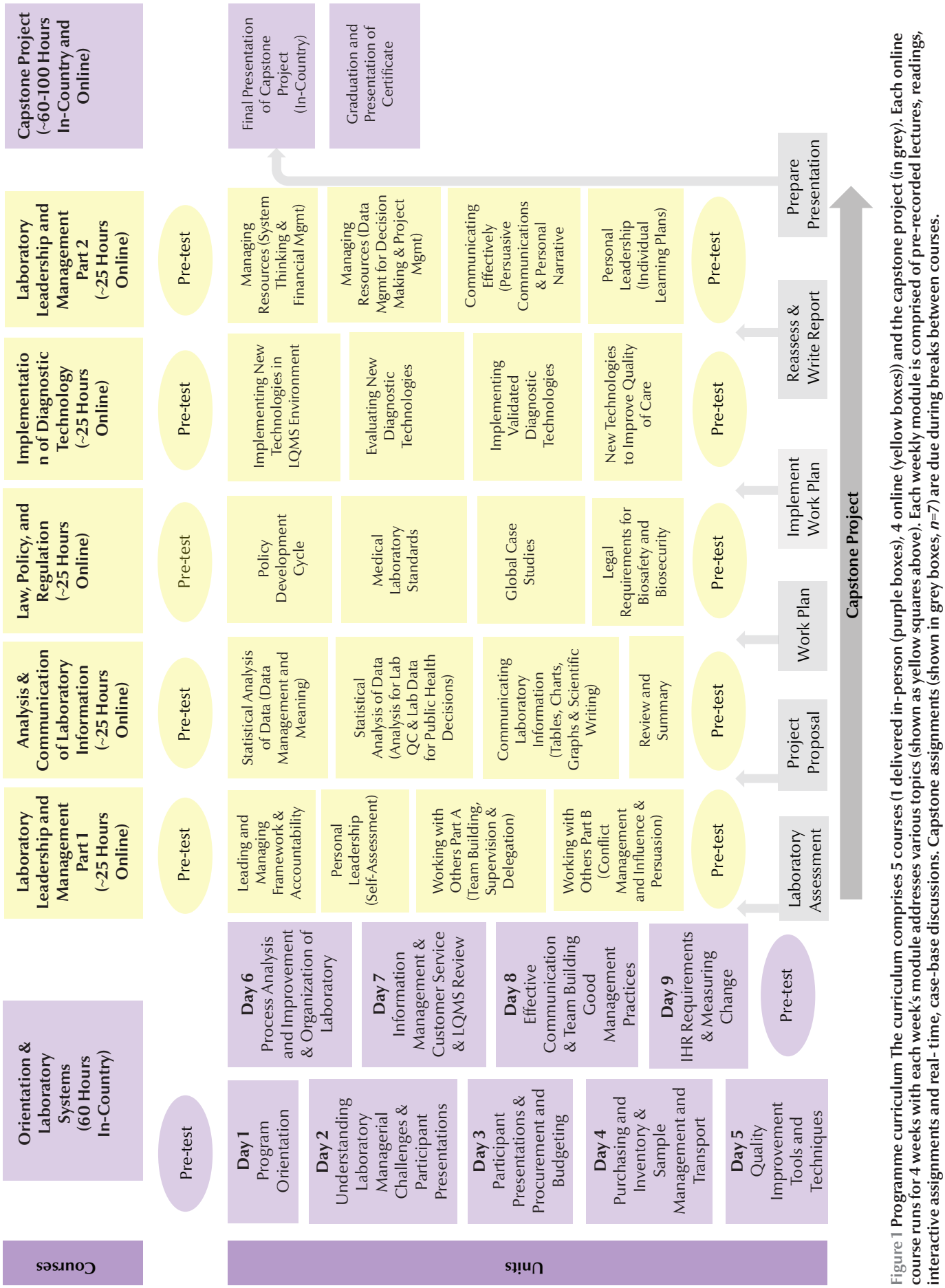

Figure 1 Programme curriculum The curriculum comprises 5 courses (1 delivered in-person (purple boxes), 4 online (yellow boxes)) and the capstone project (in grey). Each online course runs for 4 weeks with each week's module addresses various topics (shown as yellow squares above). Each weekly module is comprised of pre-recorded lectures, readings, interactive assignments and real- time, case-base discussions. Capstone assignments (shown in grey boxes, *n*=7) are due during breaks between courses.

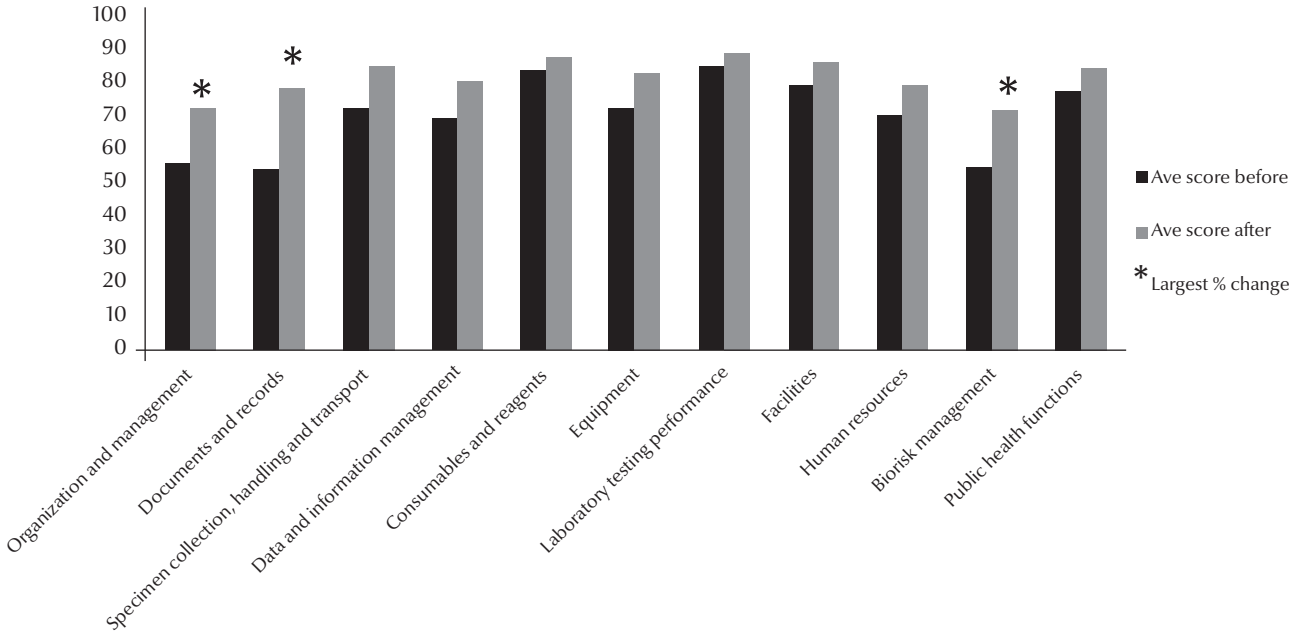

Figure 2 Laboratory capacity self- assessment scores before and after the programme Participants completed comprehensive assessments to evaluate their laboratory's operations in 11 areas. Average capacity scores improved by 11% during the 9 month-long programme and were the result of participants work on their capstone projects

Mentor recruitment and participation

Mentorship in the laboratory can improve worker performance (*28–30*) and mentors played an important role in the CPLLM. A detailed profile was developed and used to recruit qualified mentors and 11 were selected for their reputations as leaders in health laboratory practice, their experience in laboratory management, their reputations as results-driven and skilled problem solvers, and as communicative and encouraging teachers. Mentors were coached on mentoring skills at the programme kickoff meeting and throughout implementation. Each mentor supported 1–2 participants, both remotely (Canvas™, Skype™ or telephone) and in-person. Average time commitment to each participant was approximately 1–2 hours per week throughout the 9-month programme, and mentors helped participants address barriers to Capstone Project implementation and evaluated their leadership and management skills. Mentors also contributed to the online discussions where appropriate.

Programme implementation

The CPLLM began in Casablanca, Morocco in January 2014. At the orientation session, participants gave presentations about their laboratories and conveyed their goals for the programme. Orientation included an introduction to the purpose, goals and expectations of the programme, an overview of the online curriculum, Canvas™ and the Capstone Project assignments. The Laboratory Systems course followed, covering the roles and requirements of laboratories in a health system, elements of a functioning laboratory system and laboratory quality management (*31*). Participants then returned to their laboratories to conduct a laboratory self-assessment (*32*) and began the online portion of the CPLLM. Capstone Project work began in February with a comprehensive laboratory assessment; participants used thesresults to develop the goals and work plans for their Capstone Project. The Capstone Project had to have a direct, practical value within the laboratory, involve the laboratory staff and demonstrate leadership and management skills. Participants completed 7 Capstone Project assignments during the CPLLM and summarized their findings at the programme finale in September 2014.

Programme evaluation

Programme success and curriculum quality were based on a number of indicators (*33*), including programme completion rate, Capstone Project quality, discussion quality and participant and mentor feedback, and was evaluated by both quantitative and qualitative methods (*24,33,34*). Surveys assessed learner satisfaction with content, and pre/post-course tests, and in-course quizzes and assignments measured participants' comprehension; Capstone Project assignments demonstrated the application of course theory. Participant and mentor input on discussion boards was also evaluated. Course evaluations collected quantitative and qualitative data about each course. Programme evaluations were also requested from mentors. Participant progress has also been monitored since completion of

the CPLLM, measured by informal survey.

Results

The CPLLM was highly successful with 14 (80%) of the participants completing the programme and making substantial improvements in their laboratories, particularly in the areas of quality management and biosafety and biorisk management (Figure 2). All participants improved their leadership and management skills and their laboratories' performance during the programme. They also stated that course content was useful to their jobs, and said they would recommend the CPLLM to their peers. Participants indicated that mentors communicated frequently, that the frequency and duration of communications with their mentors were adequate and that their mentors were helpful, providing advice and feedback during the programme. Participant and mentor feedback sessions were also conducted at the finale meeting to get qualitative input on the programme (Table 1). This feedback was overwhelmingly positive, with the majority of responses indicating satisfaction with the programme.

Discussion

We developed the CPLLM to address the global need for improved laboratory management and leadership. It was designed for a global audience and fostered networking and collaboration, strengthening laboratory systems at the national and regional levels. The CPLLM achieved a high graduation rate due to a number of critical factors (*33*). First, appropriate participants were recruited and we ensured they had the support of their organizations and recognition by their supervisors. Strong mentorship and collective problem-solving helped ensure retention of participants in the online environment. Feedback received from this cohort was used to further refine the curriculum and optimize participant satisfaction for CPLLM implementation in other countries (the CPLLM is being implemented in Zambia in 2016).

Importantly, the CPLLM was highly regarded by participants because it delivered both theoretical and practical applications of effective laboratory leadership and management. The Capstone Project was a unique component of the CPLLM because it exemplified leadership and management theory, and resulted in measureable improvements within a short period of time, unifying the entire laboratory around a common goal. By developing strategic thinking skills, embracing process improvement and learning how to lead change, laboratory managers improved laboratory performance. Since programme completion in September 2014, many participants have communicated that they have started preparing for ISO 15189 accreditation using the new WHO Laboratory Quality Stepwise Implementation (LQSI) tool (*35*). While financial support for this cohort did not support long-term impact evaluations, these would be ideal to incorporate in future years.

The CPLLM affirms the impact of formal leadership and management training on laboratory capacity, and can build on previous investments for improved laboratory system operability and preparedness (*36,37*); the modular online curriculum allows the CPLLM to be customized with location-specific case studies for any country. The CPLLM was provided at no cost to participants thanks to generous United States of America government grants. However, for sustainability of the programme, user-fees and twinning partnerships with local universities may be pursued for future implementation. Additionally, continuing professional development credits could be pursued with national health professions associations, and may improve workforce retention (*38–40*).

Acknowledgements

The authors wish to thank the World Health Organization and the ministries of health from Egypt, Iraq, Jordan, Lebanon, Morocco, Oman, Pakistan, Qatar, Saudi Arabia and Yemen for their assistance with participant and mentor recruitment. The authors wish to thank Drs Said Al-Baqlani, Suleiman Al-Busaidy, Faisal Alhamadani, Riyadh Saif-Ali Al-Hammadi, Saeed Al-Shaibani, Rajae El-Aloud, Aktham Haddadin, Aisha Jumaan, Hoda Mansour, Magda Rakha, Muhammed Salman, and Godwin Wilson for their mentoring support during the programme. The authors are grateful to Drs Michael Noble (University of British Colombia), Rebecca Katz (George Washington University), Sheny Maria Morales Betouille (US CDC), Jennifer Gaudioso and LouAnn Barnett (Sandia National Laboratories) and Mr Peter Kyriacopoulos (Association of Public Health Laboratories) for their subject matter contribution to the programme. The authors thank Jen Hubber, Priyanka Gautom and Anne Fox for assistance in manuscript preparation.

Funding: The development and implementation of this programme in 2013–2014 was supported by grants from the United States of America Department of State Bioengagement Program.

Competing interests: None declared.

Table 1 **Participant feedback**

Programme evaluation question	Participant comments
What was your favourite part/ aspect of the programme?	I enjoyed and benefited from the programme, all the topics were important and added to my information especially leadership and management. Although the programme was interesting and valuable in its online courses and it may save money or solve technical issues, the 2 face-to-face meetings, the kickoff and final meetings, were the preferred parts for me; in the end nothing is more valuable and informative like the face-to-face meetings . Using short videos of leaders from different institutions all over the world, sharing their points of view and experience was a great idea of the programme providers.
Have you become more interested in a particular area of laboratory management or leadership as a result of taking this programme? If so what area?	Communication skills, planning, and importance of data analysis. Systems thinking. The use of tools for improving team management. I've become more sensitive to Biosafety and Biosecurity issues and the regulatory aspects of laboratory management . All the contents and courses were informative but if I have to put something first then I will choose laboratory quality management system, a very critical subject; we have real problems in organizing our laboratory work. As I said in one of the discussion boards, I believe that the implementation of a quality management system is a vital part of system thinking in laboratory work.
What was the most challenging aspect of completing the Capstone assignments and why were they challenging?	Selecting the appropriate time for each steps of my work plan because it depend on my efforts also willingness of my stakeholders. Unexpected events that are outside our control, related to the general unstable condition in the country. The time for completing the project. because we all busy in many task in our job and also in continuity of online study . One of the challenges are needing approval of some implementation steps and I depending upon the prediction of the time that required for the implementation of these items in work plan. For example I need formal approval to get funds during the implementation course and this may need time. Preparing staff for change.
Were there any resources missing, that if you had them, would have helped you complete this assignment better?	More authority to implement changes. Financial resources. Time to connect with other infectious disease consultants to know from them their challenges and their concern. Stakeholders understanding of the importance of the project.
What was the most important thing(s) you learned from the Capstone project? What did you find to be of most value?	How I can organize my work and manage my time. Learning project management tools to foresee the challenges to be overcome, have a plan with detailed steps; also to have all the mitigation steps before hand and to write it down. The most valuable is to get a complete plan with all of the difficulties and how to go about it. Assigning responsibilities to my colleagues (staff of the unit). Reviewed relevant literature with practical approach to prepare meaningful project. How to develop work plan and this I shall use it in future projects. The most valuable is