

Developing A Network Of Researchers With Expertise In Molecular Diagnostics To Monitor And Investigate Antimicrobial Resistance



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Take home message

The international training course used theoretical online training in-country followed by practical training in the laboratories in Gujarat, India. This model prepared the participants to gain knowledge and effective skills within a short period of time and is suitable to train a large number of researchers.

Introduction:

- Antimicrobial resistance (AMR) is a global health challenge and requires accurate and rapid diagnostic methods to detect AMR in pathogens.
- The most effective and efficient methods are based on advanced molecular methods that can detect genetic mutations that transfer AMR bacteria to humans, animals and the natural environment (soil and water).

Aim

- To develop a network of researchers with the knowledge and advance skills in the molecular diagnostic methods to detect AMR

Objectives are to:

- Develop a training programme with online training followed by a practical workshop at AAU, Gujarat, India.
- Fill a research skills gap in UKRI GCRF-funded researchers of OHPH and associated networks

Generating a Network of Experts

To facilitate a smooth recruitment, a Google form was designed and implemented.

- 466 applications were received for a total of 60 places in Cohorts 1 & 2
- 689 applications were received for 60 places in cohorts 3 & 4
- A further online form was created to begin building a network of postgraduate students and researchers worldwide within the field of AMR and beyond.

Methods

Online Course Development	Online Course Outline	Pedagogical Course Design
<ul style="list-style-type: none"> Designed and implemented using iHEN, the OHPH online learning environment. 	<ul style="list-style-type: none"> Delivered over 6 weeks with an estimated total of 71 learning hours. Course completion provides a total of 7 UK CATs credits. 	<ul style="list-style-type: none"> Weekly unit books Video lectures for each unit module Additional reading materials MCQ learning checks Weekly tutor-led live synchronous sessions

Unit Title	Availability
First steps to explore AMR	Available from 29 August 2022, 12:05 AM
Next-Generation sequencing (NGS) to investigate AMR	Available from 5 September 2022, 12:05 AM
Curating of AMR sequencing data	Available from 12 September 2022, 12:05 AM
Making the most out of AMR sequencing data	Available from 19 September 2022, 12:05 AM
One Health Approach to AMR	Available from 26 September 2022, 12:05 AM
Bioinformatics tools to analyse AMR sequencing data	Available from 3 October 2022, 12:05 AM
Assessment	

Figure 1: Details of the design of and unit titles of online course

In this session you will be introduced to the basic concepts of antibiotic therapy and the development of antimicrobial resistance (AMR). This will include:

- An introduction to the history and discovery of antibiotic chemotherapy
- How antibiotic drugs are classified and their mechanisms of action
- The mechanisms of development and transmission of AMR within and to other bacteria

To complete this session, please watch the lecture video and read or watch the additional materials provided. These include a brief write up of the topics covered in the lecture and links to external resources.



- Unit Introduction
- Unit 1 Discussion Forum
- Link to Live Session
- Recording of Unit 1 Live
- Antibiotics and how AMR develops
- Reading Materials
- MCQ
- Growing Pure Cell Culture
- Reading Materials
- MCQ

Figure 2: An example of some of the elements of Unit 1 online course on iHEN

Results

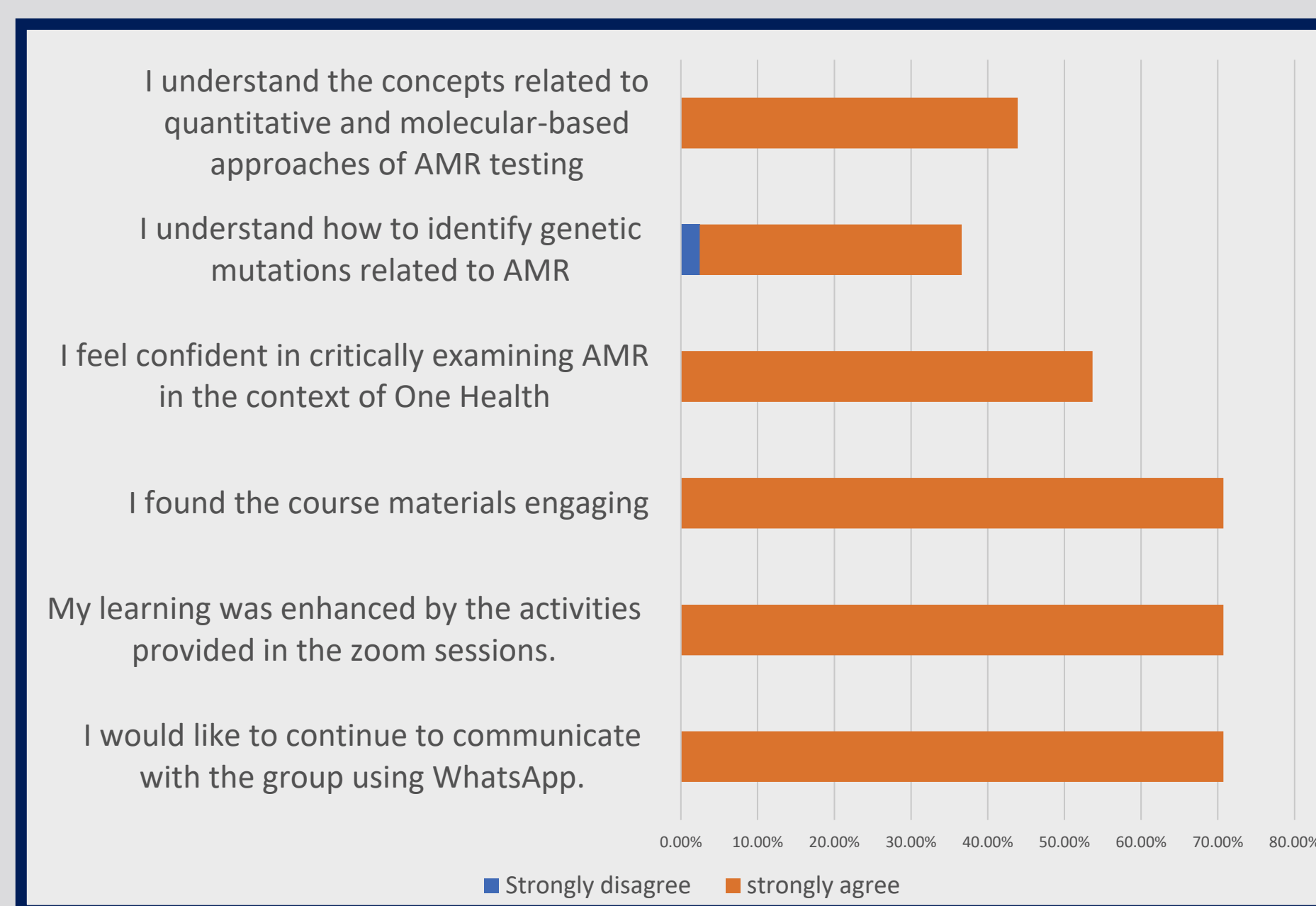


Figure 3: Participant evaluation of the online course shows effective learning to gain confidence in detecting gene mutations of AMR.

Country	Number of Participants
Afghanistan	1
Bangladesh	9
Burkina Faso	2
Egypt	2
Ethiopia	5
Fiji	2
Germany	1
India	68
Italy	1
Japan	1
Kenya	2
Nepal	3
Nigeria	3
Norway	1
Pakistan	1
Philippines	1
Rwanda	1
Somalia	1
South Africa	1
Sri Lanka	5
Uganda	1
United Kingdom	3
United States	1
Vietnam	5

Figure 4: Overall figures of participation globally

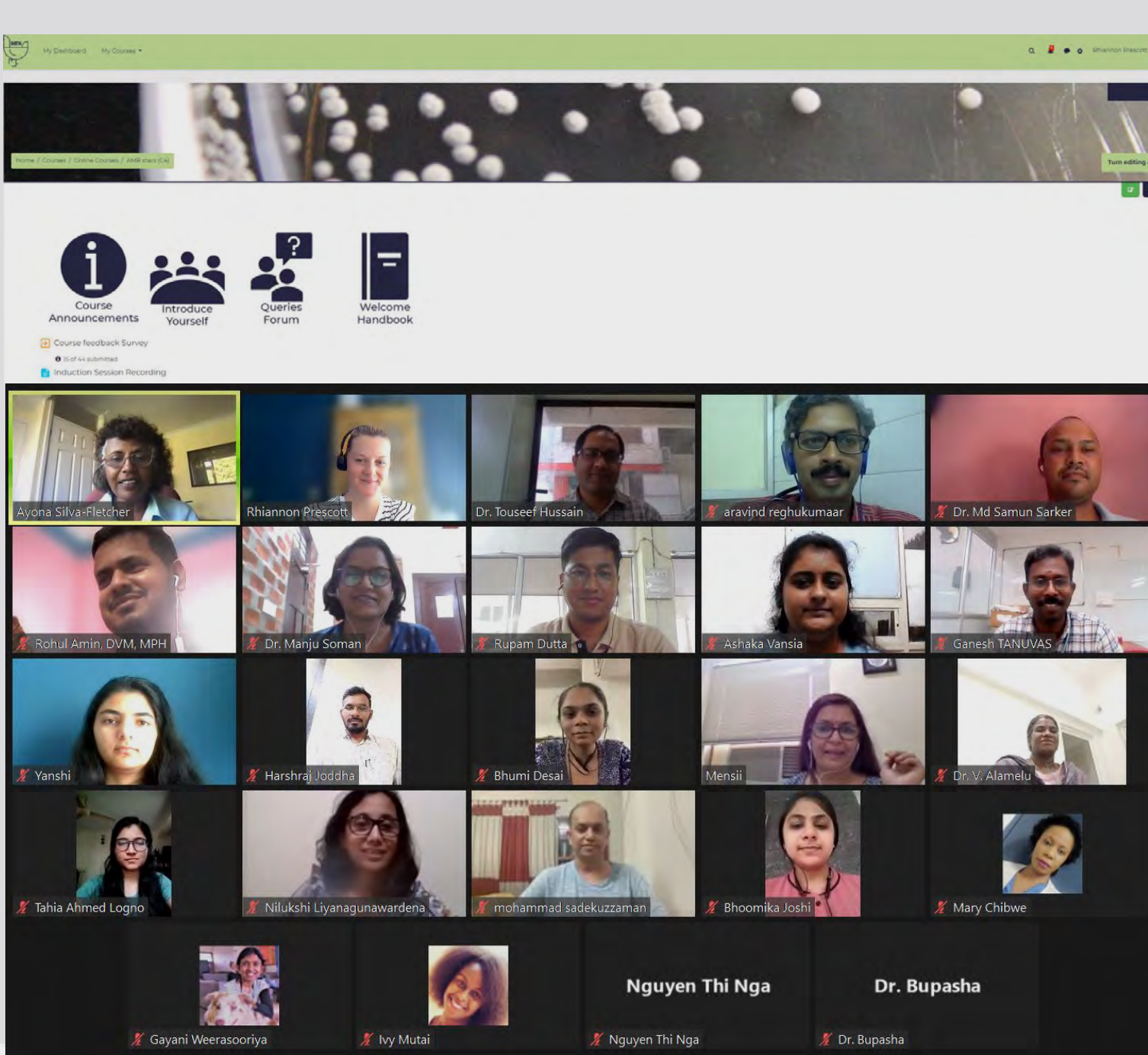


Figure 6: Screen capture of an online synchronous zoom tutorial



Figures 7 & 8: Attending laboratory training at the practical course in Gujarat, India.



"I wholeheartedly thank AAU, GBRC, and RVC for organising this wonderful course. We are naive to the NGS and learned many things starting from basics with short and crisp video lectures and related write-ups and links for the course. All the lectures were beautifully designed by the tutors along with MCQs."
-Cohort 1 participant

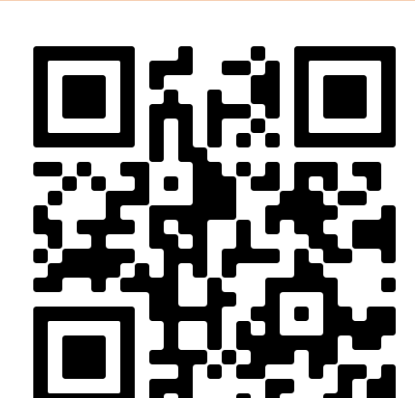


Figure 9: Images from the first round of practical training in Gujarat, India

Discussion

- The growing prevalence of AMR is a global health challenge. The need to train professionals and researchers to detect AMR genes in bacteria using advanced molecular methods is now more urgent than ever.
- This programme has provided an opportunity to gain knowledge and skills and helped to establish a global collaborative network of researchers in AMR.

"The tutorials were fabulous. Applying the weekly material to a task and sharing our answers and understanding of the content with different classmates each week was always fun and helped to cement knowledge. I would also like to commend the course tutors for making a truly open and safe environment to ask questions and make mistakes without judgment or embarrassment. Finally- the opportunities to engage with classmates week by week enabled us to really get to know each other"
- Cohort 2 participant



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