MediPIET Summary report of work activities

Karo Palayan

Armenia, Cohort 4 (2021–2024)

Background

About MediPIET

The Mediterranean and Black Sea Programme for Intervention Epidemiology Training (MediPIET) aims to enhance health security in the Mediterranean and the Black Sea region by supporting capacity building for prevention and control of natural or man-made threats to health posed by communicable diseases. It is a competency-based in-service two-year fellowship during which selected fellows conduct projects and field investigations at a MediPIET Training Site in their home country and attend MediPIET modules.

Since mid-2021, MediPIET is implemented by ECDC as a part of the EU Initiative on Health Security. You can find more information about the programme at: https://www.ecdc.europa.eu/en/training-and-tools/training-programmes/fellowships/medipiet

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Pre-fellowship short biography

Karo is an engineer and has two master's degrees in mechanical engineering and machine science, and management. In 2022, he graduated from the Global Laboratory Leadership Programme (GLLP) funded by the United States Centres for Diseases Control and Prevention (US CDC).

Since 2005, Karo has been working at the National Centre for Disease Control and Prevention (NCDC) of the Republic of Armenia. Since 2016, he has been responsible for the IT engineering team of NCDC. His main responsibility was the implementation of measures to reduce the impact of acoustic and other physical factors on the human body. In addition, he was also responsible for NCDC electronic systems and databases. During 2019–2022, he was a member of the COVID-19 Management Task force, and worked on the implementation of the COVID-19 Emergency Operation Centre (EOC).

Fellowship

In September 2021, Karo started his MediPIET fellowship at the NCDC of the Republic of Armenia. This report summarises the work performed during the fellowship.

National supervisor(s):

Dr Lusine Paronyan (2021–2022), Dr Lilit Avetisyan (2022), Dr Ani Manukyan (2023–2024)

Scientific coordinator:

Liese Van Gompel (for the first six months), Dr Pawel Stefanoff (for the remaining time)

Fellowship projects

1. Surveillance

Evaluation of the COVID-19 electronic surveillance system in Armenia, March 2020 – January 2023

Introduction: On 1 March 2020, Armenia recorded the first case of COVID-19. In April 2020, NCDC implemented a new COVID-19 module into the national electronic management system for communicable diseases (ARMED). We aimed to evaluate the attributes of the COVID-19 surveillance system in Armenia during March 2020–January 2023 in order to identify areas for improvement.

Methods: We described the surveillance system in terms of its objectives, stakeholders and data flow. We used the surveillance dataset from 2020–2022, and surveyed stakeholders from Yerevan city and the 10 regions. Between July and August 2023, the survey link was posted in a group chat on Facebook which was accessible for persons within NCDC who were responsible for the management of COVID-19. We assessed: usefulness based on the opinions of stakeholders; simplicity by describing the structure and ease of operation of the system; data quality by reviewing completeness of identified key surveillance variables; acceptability based on feedback from stakeholders regarding their willingness to provide the data; representativeness by reviewing the list of all healthcare facilities and the number of cases of COVID-19 they reported during the evaluation period; stability by obtaining feedback from stakeholders regarding their experiences of system failures.

Results: The objective of the surveillance system was to describe COVID-19 epidemiological trends and to monitor the effectiveness of control measures. Laboratories and healthcare facilities uploaded confirmed cases to ARMED within 24 hours, while NCDC prepared periodic reports for the Ministry of Health for policy making.

Only 25% of stakeholders interviewed considered this system as very useful. Out of the respondents, 57% agreed that it was easy to enter the data of a patient with COVID-19 into the ARMED system in 2021, compared to 2020. Data quality varied between variables. Information on age, sex, hospital information, date of specimen collection and death were 100% complete. Meanwhile, information regarding the date of symptoms onset and the underlying chronic conditions were missing in 100% of the notifications. The system appeared to be acceptable, although half of respondents indicated the COVID-19 data entry form was too long. In terms of representativeness, although the data were collected from all healthcare facilities, the system could not capture all the cases. Assessing stability, 72% of the respondents indicated that they sometimes faced system failures.

Conclusions: The COVID-19 surveillance in 2020–2021 suffered from several shortcomings. It was considered not useful, not simple enough, with insufficient acceptability, data quality, representativeness and stability. Surveillance users struggled with long forms which were difficult to complete, there was a lack of regular trainings on the electronic tools, and frequent system failures. We recommended that the data entry form be revised and shortened, organised regular trainings for the operators of the ARMED system, developed standard operating procedures, and added a function that allows to create the weekly or annual report form.

Keywords: surveillance system, evaluation, COVID-19, Armenia.

Role and outputs: Principal investigator. Karo drafted the protocol after reviewing previously published literature, international guidelines, and country reports. He was responsible for developing the survey questionnaire and collecting data using KoboToolbox software, data cleaning and analysing, and preparing the final report.

Supervisor(s): Ani Manukyan

Status: Completed

2. Outbreaks

Outbreak of measles related with nosocomial transmission in Armenia, March–July 2023

Background: During 2002–2022, Armenia maintained effective vaccination against measles offered at the age of 12 months and six years. Only sporadic cases were notified. On 3 March 2023, a healthcare facility notified 13 suspected cases of measles among hospitalised patients to the National Centre for Disease Control and Prevention (NCDC). We investigated the outbreak, to identify its extent and to understand the patterns of transmission.

Methods: We defined a suspected case as any person with maculopapular rash and/or fever. A confirmed case was a suspected case that was confirmed by the detection of specific antibodies. We actively searched for cases by contacting all persons who visited the affected facilities and interviewing contacts of confirmed cases. We defined the transmission chain as established link between confirmed cases, based on the incubation interval (7–14 days) and places/persons mentioned during the interview.

Results: During March–July 2023, out of approximately 7,000 contacts investigated, 868 met the criteria for suspected cases, 284 were laboratory-confirmed cases, and three had an epidemiological link with a confirmed case. The ages of the cases ranged from 0–64 years, and the median age was 8 (IQR=25) years. 75% were not vaccinated, 10% had one dose, 8% had two doses, and the vaccination status of 7% was unknown. We identified one main transmission chain, involving 177 cases. The index case was a five-year-old boy who developed symptoms on 4 February 2023 after visiting several European countries. A nurse working in a paediatric clinic acquired the infection from the boy. 15 cases were among healthcare workers (HCWs), of who only one received a dose of measles vaccine.

Out of 183 cases with known place of exposure, 129 (70%) were exposed within the healthcare facilities, 54 (30%) in the community setting, 66 (36%) had unknown infection source, and 38 (13%) were exposed abroad. Local authorities vaccinated 33,385 healthcare personnel, patients, and their contacts.

Conclusion: Under-vaccinated HCWs contributed to the spread of this measles outbreak. We recommended mandatory vaccination of all HCWs working with patients, improving monitoring of vaccination uptake, vaccinating under-served community subgroups, and assuring compliance with isolation and contact precautions when hospitalising suspected cases of measles.

Keywords: measles, outbreak, nosocomial infection, post-elimination stage, Armenia.

Role and outputs: Member in the national outbreak investigation team. Karo drafted the protocol after reviewing previously published literature, international guidelines, and country reports. He was involved in all the steps of the outbreak investigation, data entry, data analysis, and prepared the final report. He submitted an abstract to the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2023 and presented this outbreak investigation at the MediPIET Scientific Event, 2023 in Barcelona, Spain. He also prepared a manuscript for a peer-reviewed journal.

Supervisor(s): Ani Manukyan, Gayane Sahakyan, Pawel Stefanoff.

Status: Completed.

3. Research

Knowledge, attitude and beliefs regarding varicella infection and immunisation among healthcare workers in Armenia: a cross-sectional survey, 2023

Introduction: Varicella is a highly transmissible viral, usually mild disease. Varicella is a notifiable disease in Armenia. In 2024, Armenia planned to include the varicella vaccine in the National Immunization Programme. This study aimed to evaluate the knowledge, attitudes and personal beliefs of healthcare workers (HCWs) towards varicella infection and immunisation in order to inform the communication on the future immunisation programme in Armenia.

Material and methods: We surveyed a convenience sample of HCWs working in immunisation, mostly from the capital Yerevan. From October 15 to November 30, 2023, we distributed a self-administered questionnaire among the participants of 45 training workshops organised in all the regions of Armenia. Before the start of each workshop, consenting participants were asked to complete an anonymous questionnaire. Knowledge score based on nine specific questions (0–9) was categorised using Bloom's cut-off point of 80%, as 'good' for ≥8 points, 'moderate' for 5–7 points, and 'poor' for ≤4 points. Univariable linear regression analysis were performed using EpiInfo v7.2. In addition, we investigated the association between the knowledge level and the expressed attitude.

Result: A total of 779 HCWs completed the survey. 96% of the respondents were women, aged from 21 to 77 years with a median of 53±11yrs. 52% percent of the respondents were nurses. The mean knowledge score (0–9) was 7±1.26. The level of knowledge was 'good' among 33%, 'moderate' among 63% and 'poor' among 4% of the respondents. The mean knowledge score was 6.7 among nurses and 7.4 among physicians. Physicians were more likely to have a high knowledge score ($\beta = 0.498$, $p<0.05$), compared to nurses. 85% of HCWs would advise others to get immunised, and 88% of them considered taking the vaccine to protect themselves, their family and patients. HCWs who were ready to get the vaccine in future were more likely to have high knowledge ($\beta = 1.1$, $p<0.05$) on varicella.

In contrast, HCWs who had lower knowledge scores were more likely to refuse vaccination if they were offered (β = -1.3, p<0.05), or still didn't know whether they would take the vaccine (β = -1.01, p<0.05).

Conclusion: The study highlighted inadequate knowledge regarding varicella immunisation, especially among nurses. We recommended improving the post-graduate education of healthcare workers on varicella and varicella vaccines in order to prepare the groundwork for a future varicella immunisation programme.

Keywords: HCWs, varicella, vaccination, Armenia.

Role and outputs: Principal investigator. Karo drafted the protocol after reviewing previously published literature, international guidelines, and country reports. He developed the questionnaire and informed consent form, developed data entry mask, performed data entry, data analysis, and prepared the final report.

Supervisor(s): Ani Manukyan, Gayane Sahakyan, Lilit Karapetyan.

Status: Completed. Report submitted to the Ministry of Health.

4. Scientific communication

Conference presentations

- **Palayan K.** Outbreak of measles related with nosocomial transmission in Armenia, March–July 2023. MediPIET Scientific Event, November 2023. Barcelona, Spain.

Publications and outputs

- **Karo Palayan**, Ani Manukyan, Pawel Stefanoff, Gayane Sahakyan, Svetlana Grigoryan, Lilit Karapetyan, Gayane Melik-Andreasyan, Shushan Sargsyan, Artavazd Vanyan. "Outbreak of measles related with nosocomial transmission in Armenia, March–July 2023", manuscript submitted to *Eurosurveillance* journal.
- Gobin S, Sahakyan G, Kusi Appiah M, Manukyan A, **Palayan K**, Ebama M, Vanyan A, McCarron M, Bresee J. Costs of in- and outpatient respiratory disease and the seasonal influenza vaccination program in Armenia-2020-2021. Vaccine. 2024 Jun 4:S0264-410X(24)00623-6. doi: 10.1016/j.vaccine.2024.05.055.

5. Teaching activities

A training session for NCDC Armenia - introduction to Geographical Information Systems (GIS)

Karo prepared and delivered an online three-hour training on GIS system for beginners in Armenian. The training was addressed to NCDC employees, particularly statisticians, epidemiologists involved in statistical data management and visualisation. The training was limited to 41 participants for logistical reasons. Karo adapted materials and presented the training according to the recommendations of international experts and researchers. The training session included a theoretical part with presentation, and an interactive discussion.

The learning objectives for this teaching activity were to:

- understand the basic concepts of GIS;
- learn the history of development, benefits, components of the GIS system;
- encourage using the GIS system in the research projects of NCDC employees;
- discuss the strengths and weaknesses of GIS for data presentation.

The learning needs of the audience was assessed beforehand by filling out a pre-test questionnaire (multiple-choice questions). After the training course participants took an online post-test for the evaluation of the knowledge and skills gained during the course. The teaching session took place on 28 June 2023.

6. International Assignments

None

7. Other activities

During his MediPIET fellowship, Karo also participated in several other activities, which improved his skills, including:

- Participation in decision-making of adapting changes in recommendations for COVID-19.
- Preparation of the daily, weekly, monthly and annual bulletins for COVID-19, influenza and different communicable diseases (including data analysis and creating maps).
- Participation in health education campaigns.
- Participation in Ministry of Health assignments as member of different working groups.
- Participation in meetings of the NCDC of Armenia, NGOs and other stakeholder meetings.
- Communication and presentation in different online and face-to-face workshops both nationally and internationally.

Trainings

- 2 August 2021–8 December 2022-*graduated GLLP mentor Global Laboratory Leadership Programme (GLLP) funded by the Centres for Diseases Control and Prevention (CDC) and conducted by Integrated Quality Laboratory Services (IQLS).*
- January 25–27, 2023-Securing laboratory infrastructure in a post-pandemic age focusing on cyber hygiene and cyber-biosecurity, Health security partners.

8. MediPIET modules attended

- Introductory course – Part 1, 20 September – 8 October 2021, online
- Inject day Phylogeny, 20 October 2021, online
- Inject day operational research, 26 – 27 October 2021, online
- Inject days data collection, 10–11 November 2021, online
- Outbreak investigation, 6–10 December 2021, online
- Multivariable analysis, 14–18 March 2022, online
- Multivariable analysis inject day, 30 March 2022, online
- Project Review Module & Introductory Course -Part 2, 20–29 April 2022, Spetses, Greece
- Rapid Assessment and Survey Methods + Mass Gatherings, 6–10 June 2022, Stockholm, Sweden
- Project Review Module II, 29 August – 2 September 2022, Lisbon, Portugal
- Times Series Analysis, 7–11 November 2022, Utrecht, the Netherlands
- Qualitative research inject days, 31 January and 3 February, 2023, online
- CBRN module, 13–17 February 2023, Petrovac, Montenegro
- Vaccinology inject day, 29 March 2023, online
- One Health & VBD, 2–4 May and 15–17 May 2023, online
- Project Review module, 28 August – 1 September 2023, Lisbon, Portugal

Supervisors' conclusions

Lusine Paronyan – Karo's enthusiasm and ability to effectively communicate and collaborate within multidisciplinary teams has been commendable, fostering a culture of cooperation and mutual respect. In conclusion, I have every confidence that Karo Palayan will continue to excel in his professional journey, making significant contributions to the field of public health. His passion, coupled with the skills and insights gained from the MediPIET programme, will allow him to reach all his career objectives. I am deeply thankful to the MediPIET programme for providing both fellows and supervisors with this invaluable opportunity. I extend my utmost respect and gratitude to Pawel Stefanoff, Karo's scientific coordinator, for his unwavering dedication and invaluable assistance throughout this journey.

Ani Manukyan – Let me express my sincere gratitude to the MediPIET fellowship for providing invaluable opportunities for fellows to delve deeper into the field of epidemiology. Karo's participation in the programme has been particularly beneficial, and I am confident that he will prove to be a significant asset to the NCDC. It's been a pleasure to watch his growth and development throughout the fellowship. Karo has demonstrated an amazing level of dedication to his work, and his enthusiasm for epidemiology is clear in every assignment he takes on. Working alongside him has been a seamless experience, as he approaches his responsibilities with an enthusiasm. I have found it effortless to support and collaborate with Karo, and I am pleased to have played a role in his professional journey.

Furthermore, I must acknowledge the invaluable support and mentorship provided by Pawel Stefanoff, Karo's scientific coordinator. From the outset of the fellowship until now, Karo's progress has been remarkable, and he continues to exhibit a strong desire for learning and growth. As his supervisor, I am more than willing to offer further assistance and guidance.

Scientific coordinator's conclusion

Pawel Stefanoff – Because of non-medical background and many challenges related to frequent changes of supervisors, Karo had to make substantial efforts to go through his fellowship. He demonstrated commitment and a positive attitude. Also, it was rewarding to see how he improved his competencies in epidemiology and biostatistics. He was always ready to support other fellows and build good relations with other fellows from his cohort and beyond.

Personal conclusions of fellow

Participating in the MediPIET fellowship has been a life-changing experience. I've had the opportunity to fully immerse myself in the broad field of public health. I've gained invaluable knowledge and skills along the way. It has not only enhanced my understanding of the field but also broadened my perspective, enabling me to understand the importance of public health initiatives.

Working with enthusiastic people who are committed to advancing epidemiology and public health has been one of the fellowship's highlights. This network of mentors and colleagues has been extremely important to my growth both personally and professionally. Exposure to real-world public health challenges, ranging from epidemiological investigations to policy formulation, has armed me with the tools necessary to drive meaningful change in community and population healthcare. In summary, the fellowship has been an enriching journey that has equipped me with the knowledge and skills needed to deal with urgent healthcare issues.

Acknowledgements

Unfortunately, my supervisor Lilit Avetisyan has passed away. I'd like to express my gratitude to for her invaluable guidance during the MediPIET application process and for her substantial contributions to my education and knowledge.

I would like to express my gratitude to the NCDC staff for their support and commitment over my two-year fellowship. They supported me to complete my projects and shared their knowledge.

I couldn't be more thankful to my supervisor and scientific coordinator, Ani Manukyan and Pawel Stefanoff, who were always available and greatly supported me in this challenge, taught me so much, and guided me in many different areas. In addition, I would like to thank my first scientific coordinator, Liese von Gompel, who worked with me during the first six months and supported me at the beginning of my fellowship.

A special acknowledgement for the ECDC and MediPIET teams for their deep dedication to the programme and fellows. I want to thank all my friends from Cohort 4 and colleagues from ECDC, for sharing their experiences and great moments over the past two years.

I'm fortunate to have the best mentors, colleagues and friends around me. I am grateful to all of you! They became a role model for my future career.

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