

WORLD HEALTH ORGANIZATION – FINAL PROJECT REPORT

Project Title:

Antimicrobial Resistance and Healthcare-Associated Infection Prevention Project

Funding Source:

ASEF III Programme (Direct Financial Cooperation)

Implementing Institution:

Comenius University Bratislava – Faculty of Medicine
University Hospital Bratislava (LFUK / UNB)

WHO Technical Counterpart:

WHO Country Office, Slovakia

Implementation Period:

16 February to 31 March 2026 (Phase II)

Approved Budget:

EUR 20,000

1. Background

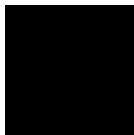
Antimicrobial resistance (AMR) and healthcare-associated infections (HAIs) represent a growing public health challenge across the WHO European Region. In Slovakia, increasing detection of multidrug-resistant organisms (MDROs), including carbapenem-resistant Enterobacterales (CRE), has highlighted the need to strengthen infection prevention and control (IPC) practices, standardize clinical procedures, and improve environmental hygiene in hospital settings.

University Hospital Bratislava, as a tertiary referral centre managing high-risk patient populations and complex clinical procedures, faces elevated risk of HAI transmission. Phase I of this project was therefore designed as a preparatory and capacity-building intervention under the ASEF III Programme, focusing on institutional readiness, workforce capacity, and pilot implementation of disinfection technologies, while establishing a foundation for expanded microbiological screening and surveillance activities planned for Phase II.

2. Objectives

The objectives of Phase II were to:

1. To consolidate and expand the surveillance and screening activities initiated in Phase I.



2. To scale up training and the application of infection prevention and control measures across target departments.
3. To conduct comprehensive data analysis, evaluation, and policy-oriented dissemination of results.

All objectives were achieved within the approved timeframe and budget.

3. Project Activities

3.1 Surveillance and Screening

Completion of microbiological screening for patients and healthcare workers (including refugee populations), utilising the protocols established in Phase I. This includes laboratory analysis, antibiotic resistance profiling, and integration of findings into national and hospital surveillance systems.

3.2 Full Operation of Disinfection Technologies

Routine deployment of all available germicidal lamps and hydrogen peroxide dry-mist devices for environmental decontamination, coupled with effectiveness assessments to refine SOPs.

3.3 Staff Capacity Building and Awareness

Delivery of an additional 2-3 training workshops, bringing the cumulative total to at least 100 trained healthcare workers across both project phases, and extension of the "Safe Care" awareness initiative hospital-wide.

3.4. Data Analysis, Evaluation, and Policy Dialogue

Comprehensive analysis of all microbiological and IPC data generated across both phases to produce evidence-based recommendations. Findings will be presented to the Ministry of Health's National Committee on Antimicrobial Treatment and Stewardship and other key stakeholders, with a consolidated final report submitted to WHO and ASEF donors.

4. Results and Outputs

During Phase II, all planned outputs were delivered within the approved timeframe and scope, resulting in measurable improvements in institutional preparedness for AMR and HAI prevention.

A total of 50 consecutively admitted patients with a history of recent hospitalisation in external healthcare facilities were screened for potential imported nosocomial colonisation. The cohort comprised 27 women (54%) and 23 men (46%), with a mean age of 79.1 ± 10.3 years. Screening cultures were obtained at admission from four anatomical sites (nasal, tonsillar/oropharyngeal, rectal swabs, and urine samples). Only microbiologically relevant abnormal findings were included in the analysis, while expected commensal flora (e.g., coagulase-negative staphylococci or corynebacteria) were excluded (Table 1).



Overall, abnormal colonisation or microbiological positivity at at least one sampling site was identified in 30 of 50 patients (60%). The distribution of positivity differed markedly between anatomical sites. Urinary samples demonstrated the highest rate of microbiological positivity, detected in approximately 22 patients (44%), followed by rectal swabs in 14 patients (28%), tonsillar/oropharyngeal swabs in 6 patients (12%), and nasal swabs in 2 patients (4%). Nasal findings were predominantly represented by commensal flora, with only a small number of clinically relevant Gram-negative isolates detected.

The most clinically significant findings were related to the presence of multidrug-resistant organisms (MDROs). Extended-spectrum β -lactamase (ESBL)-producing Enterobacterales were identified in 14 patients (28%), representing the dominant resistant phenotype in the cohort. Among these, ESBL-producing *Escherichia coli* accounted for 9 cases (18%), while ESBL-producing *Klebsiella pneumoniae* accounted for 5 cases (10%). Less frequent resistant phenotypes included one carbapenemase-producing *Klebsiella pneumoniae* (CPE) isolate (2%), one vancomycin-resistant *Enterococcus* (VRE) isolate (2%), and one isolate with an AmpC β -lactamase phenotype (2%).

When analysed according to anatomical distribution, rectal swabs represented the principal reservoir of MDRO carriage, accounting for 14 positive detections, followed by urinary samples with 6 MDRO detections, tonsillar/oropharyngeal swabs with 4 detections, and nasal swabs with a single MDRO detection. Multisite colonisation was observed in a subset of patients, indicating that several individuals harboured resistant organisms across more than one anatomical location.

Taken together, these findings demonstrate that imported abnormal colonisation was common in this elderly cohort of previously hospitalised patients, affecting approximately three fifths of screened individuals. The microbiological burden was primarily driven by rectal carriage of ESBL-producing Enterobacterales, while urinary positivity was frequent but may partly reflect colonisation or asymptomatic bacteriuria in this population. Notably, although carbapenemase-producing and vancomycin-resistant organisms were rare, their detection highlights the importance of admission screening for early identification of potentially high-risk transmission sources within hospital settings.

Table 1. Baseline Characteristics and Microbiological Results of Admission Screening for Imported Nosocomial Colonisation (n = 50)

Category	Parameter	Value	Percentage
Demographic characteristics	Total patients	50	—
	Female	27	54%
	Male	23	46%
	Mean age	79.1 $\pm$ 10.3 years	—
Screening positivity by anatomical site	Urine samples	22	44%
	Rectal swabs	14	28%
	Tonsillar/oropharyngeal swabs	6	12%
	Nasal swabs	2	4%



Overall colonisation status	Any abnormal microbiological finding	30	60%
Multidrug-resistant organisms (MDROs)	ESBL-producing <i>Escherichia coli</i>	9	18%
	ESBL-producing <i>Klebsiella pneumoniae</i>	5	10%
	Carbapenemase-producing <i>K. pneumoniae</i> (CPE)	1	2%
	Vancomycin-resistant <i>Enterococcus</i> (VRE)	1	2%
	AmpC-producing Enterobacterales	1	2%
	Total MDRO carriers	14	28%
Anatomical distribution of MDRO detection	Rectal swabs	14	—
	Urine samples	6	—
	Tonsillar/oropharyngeal swabs	4	—
	Nasal swabs	1	—

AmpC: AmpC β -lactamase; CPE: carbapenemase-producing Enterobacterales; ESBL: extended-spectrum β -lactamase; MDRO: multidrug-resistant organism; SD: standard deviation; VRE: vancomycin-resistant Enterococcus.

Employee screening report: As the last step of the project, employee screening was carried out to detect possible colonization and carriage of multidrug-resistant (MDR) bacteria. The collected swabs were analyzed for bacterial identification at the Microbiology Institute of the Faculty of Medicine. The presence of MDR bacteria was not confirmed in any of the analyzed samples.

Data curation, statistical analysis, and clinical interpretation were performed by: Yashar Jalali, MD, PhD.

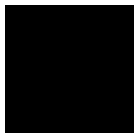
Clinical samples were collected at the 5th Department of Internal Medicine, University Hospital Bratislava, Slovakia.

Microbiological laboratory diagnostics were performed at the Institute of Microbiology, Faculty of Medicine, Comenius University in Bratislava, by Iryna Voronkina, MD, PhD; and Ján Koreň, MD, PhD.

According to the **corrected and certified DFC FACE Form**, total eligible expenditures incurred during the implementation period **16 February – 31 March 2026** amounted to **EUR 20,000**. The full amount was **incurred by the implementing partner, verified, and accepted by WHO**, with **no outstanding balance** remaining at the end of the reporting period. All expenditures were incurred in line with the approved budget and within the agreed implementation timeframe.

5. Outcomes

Phase II implementation resulted in measurable institutional and system-level outcomes.



At the operational level, screening findings indicate that imported abnormal colonization was common in the older cohort of previously hospitalized patients, affecting approximately three-fifths of screened individuals. The microbiological burden was primarily due to rectal carriage of ESBL-producing Enterobacteriaceae, while urine positivity was common but may in part reflect colonization or asymptomatic bacteriuria in this population. It is noteworthy that although carbapenemase-producing and vancomycin-resistant organisms were rare, their detection highlights the importance of screening on admission for early identification of potentially high-risk sources of transmission in the hospital setting.

At system level, the results of the microbial screening confirmed the importance of implementing increased disinfection technology in the ward given the presence of microorganisms at multiple anatomical sites.

6. Challenges and Mitigation Measures

Potential challenges related to procurement timelines, staff availability, and the short implementation period were mitigated through early planning, flexible scheduling of training activities, and close coordination between project partners. No significant deviations from the approved scope, timeline, or budget occurred.

7. Sustainability and Follow-up

All SOPs, training materials, and disinfection technologies introduced during Phase I have been embedded into routine hospital operations and was helpful also during Phase II connected with microbiological screening. Trained staff will continue to apply and disseminate IPC practices, and procured equipment will remain in use beyond the project period.

Phase I outputs directly support Phase II activities, which was focus on microbiological screening, AMR surveillance, and evaluation of intervention effectiveness in line with WHO and ASEF III objectives, detailed described in chapter 4 of this document.

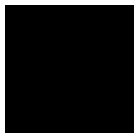
8. Strategic Alignment

The project aligns with the WHO Global Action Plan on Antimicrobial Resistance (2015), the WHO Global Strategy on Infection Prevention and Control (2021–2030), the WHO/Europe Roadmap to Implement the Global Action Plan on AMR, and ASEF III strategic objectives on strengthening health-system resilience and preparedness.

9. Lessons Learned

Early investment in SOP development and workforce training together with microbial screening is critical for sustainable IPC improvements. Combining standardized procedures with practical training and pilot testing of technologies increases adoption and compliance. Strong institutional ownership and WHO technical oversight enable efficient implementation within short timeframes.

10. Conclusion



Phase II of the *Antimicrobial Resistance and Healthcare-Associated Infection Prevention Project* was implemented successfully and in full accordance with the approved project proposal, DFC justification memorandum, and signed funding agreement.

All planned activities were completed within the approved timeframe. Based on the **corrected and certified DFC FACE Form**, a total of **EUR 20,000** in eligible expenditures was incurred during Phase II. The full amount was **accepted by WHO**, with **no remaining balance**, confirming full and compliant execution of the approved Phase II budget.

The project delivered concrete outputs and strengthened institutional preparedness for AMR and HAI prevention at University Hospital Bratislava.

Thank you once again for your support and trust in our endeavors. We are looking forward to our continued partnership and the further development of this program.

Warm regards,

Assoc. prof. Adriána Liptáková, MD, PhD, MPH, univ. prof.
Project Coordinator

Appendix



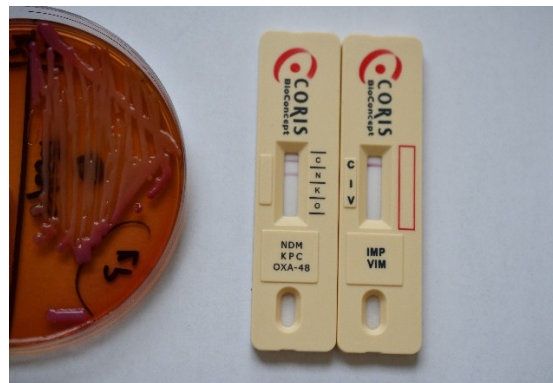
previ color device



K. pneumoniae (URselect agar)



**Nasal and tonsil swab
(employee screening, blood agar)**



**Positive O.K.N.V.I. RESIST test
(K. pneumoniae CPE, type NDM)**



taking over disinfection equipment at the clinic (MD Y. Jalali and K.Glodova)



disinfection in patient rooms



patient/employee samples taken