4th Meeting of the WHO AMR Surveillance and Quality Assessment Collaborating Centres Network – *Meeting Report*

21st-23rd MARCH 2023 Buenos Aires, ARGENTINA



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Abbreviations

AFRO Regional Office for Africa
AMC Antimicrobial Consumption
AMR Antimicrobial Resistance

AMRO/PAHO Regional Office for Americas, Pan-American Health Organization

AMU Antimicrobial Use AoW Area of Work

APW Approval for performance of work AST Antibiotic Susceptibility Testing

AWaRe Access-Watch-Reserve BOD Burden of Disease BSI Bloodstream Infection

CAESAR Central Asian and European Surveillance of Antimicrobial Resistance

CC Collaborating Centres

CDDEP Center for Disease Dynamics, Economics & Policy

CO Country Office

CRE Carbapenem resistant Enterobacterales

DG Director-General

DSP Diagnostic Stewardship Program

EARS-Net European Antimicrobial Resistance Surveillance Network

EB Executive Board

EML Essential Medicines List

EMRO Regional Office for the Eastern Mediterranean

EQA External Quality Assessment

ESBL Extended-spectrum beta-lactamase

EURO Regional Office for Europe

EVIP-Net Evidence-Informed Policy Network FAO Food and Agriculture Organization

GAP Global Action Plan

GASP Gonococcal Antimicrobial Surveillance Programme

EGASP Enhanced Gonococcal Antimicrobial Surveillance Programme

EID Emerging Infectious Diseases

GLASS Global Antimicrobial Resistance Surveillance System

GLASS-EAR GLASS Emerging AMR Reporting

GMI Global Microbial Identifier
GPW General Programme of Work
HAI Healthcare-associated Infection

HQ Headquarters

ICU Intensive Care Unit

IPC Infection Prevention and Control

JANIS Japan Nosocomial Infections Surveillance

MDR Multidrug resistance

MoH Ministry of Health

MSF Médecins Sans Frontières NAP National Action Plan NFP National Focal Point

NRL National Reference Laboratory NSS National Surveillance System

OIE World Organization for Animal Health

PHC Primary Health Care
PPS Point Prevalence Survey

QC Quality Control

QMS Quality Management System

ReLAVRA+ Latin American and Caribbean Surveillance Network of Antimicrobial Resistance

RO Regional Office

SEARO Regional Office for South East Asia

SOP Standard Operating Procedure

SPC Surveillance, Prevention and Control
STAG Strategic and Technical Advisory Group

TA Technical Assistance

TB Tuberculosis

TISSA Tripartite Integrated Surveillance System on AMR

TOR Terms of Reference
TP Target Product

UHC Universal Healthcare Coverage

UTI Urinary Tract Infection

WAAW World Antibiotic Awareness Week WASH Water, sanitation, and hygiene

WHA World Health Assembly
WHO World Health Organization

WPRO Regional Office for Western Pacific

1. Executive summary

The World Health Organization (WHO) launched the Global Antimicrobial Resistance and Use Surveillance System (GLASS) to monitor antimicrobial resistance (AMR) in humans in 2015. The WHO AMR Surveillance and Quality Assessment Collaborating Centres Network was established in December 2016 to support WHO surveillance of AMR and quality assessment in each WHO region. The Network's mission is to build the capacity to develop and implement AMR surveillance through strengthened international collaboration and improved coordination between WHO, the Network members, and other stakeholders.

The 4th Network meeting was held in person in Buenos Aires, Argentina, from 21-23 March 2023 and focused on updating prioritized support from the Network to WHO on AMR surveillance and laboratory strengthening with a programmatic approach. 87 participants attended the meeting, of which 58 were representatives from 25 CCs (1 to 2 participants per CC on average), and 29 were representatives of the WHO staff from three levels. The objectives of the meeting included:

- sharing global and regional updates on activities to tackle AMR
- discussing challenges in implementing strategies to contain AMR
- agreeing on essential areas of work, and
- reviewing CC Network activities to support WHO in fostering the implementation of AMR national action plans (NAPs) and laboratory strengthening in LMICs for the period of 2023-2024(2025).

The meeting succeeded in updating the CC network on the WHO strategic priorities to tackle AMR and current activities of the Surveillance, Prevention and Control (SPC) Department to help countries accelerate the implementation of AMR NAPs.

The meeting outputs were agreeable and defined CC Network's plan of action covering 13 areas of work aligned with WHO's prioritized tasks:

- 1. Developing and implementing a people-centered approach to evidence-based national action plans (NAPs),
- 2. Enhancing IT solutions for AMR, antimicrobial consumption (AMC) / antimicrobial use (AMU) data collection and use,
- 3. Improving AMR surveillance in invasive fungal infection,
- 4. Consolidating national AMC surveillance,
- 5. Establishing surveillance of AMC/AMU in primary health care,
- 6. Strengthening global and country support for AMC/AMU surveillance,
- 7. Facilitating access to early quality diagnosis for AMR through laboratory strengthening and links to primary and universal health care,
- 8. Developing, piloting, and implementing prospective national AMR surveys, including reporting on SDG indicators,
- 9. Utilizing WHO Academy course for strengthening national capacity for AMR, AMC/AMU surveillance,
- 10. Consolidating One Health AMR surveillance with relevance to human health,
- 11. Estimating AMR burden of disease,
- 12. Detecting EID on AMR, and
- 13. Collaborating efforts on strategic planning and expanding networks.

WHO will consolidate the agreed work plan of the CC Network in May-June 2023 internally and with members of the CC Network. Subsequently, members of the Network and WHO staff will work together to implement key activities in each area of work during 2023-2024(25). A new monitoring and evaluation approach and tool were suggested to ensure close monitoring of the CC Network's activities regarding progress status, details of activity performed, and challenges and solutions. In addition, all members of the Network and WHO staff will communicate through the designated online channel on Teams.

This document summarizes the concept note of the meeting, key information, and discussion results of three days of proceedings, as well as conclusions and next steps.

2. Introduction

The World Health Organization (WHO) established the Global Antimicrobial Resistance and Use Surveillance System (GLASS) in accordance with the World Health Assembly (WHA) resolution WHA68.7 to support the second objective of the Global Action Plan on Antimicrobial Resistance (GAP-AMR) to "strengthen knowledge through surveillance and research". The GLASS system started with surveillance of AMR in common bacterial infections and has expanded its scope to include surveillance of antimicrobial consumption (AMC), invasive fungal infections, and a One Health surveillance model relevant to human health. As of November 2022, 127 countries have enrolled in GLASS.

In 2016, WHO established the AMR Surveillance and Quality Assessment Collaborating Centres Network to support WHO surveillance of AMR and quality assessment in each WHO region. The Network's mission is to assist WHO support countries, particularly low-income countries, in building capacity to develop and implement AMR surveillance through strengthened international collaboration and improved coordination between WHO, the Network members, and other stakeholders active in AMR surveillance-related activities.

The 4th Network meeting focused on updating prioritized support from the Network to WHO on AMR surveillance and laboratory strengthening with a programmatic approach. The meeting highlighted the need for continued support and commitment to strengthening; the national surveillance system; country participation, global collaboration and coordination between partners; data quality and representativeness; and data translation to inform policy and interventions.

There were four objectives of the meeting:

- 1. To share global and regional updates on activities to tackle AMR,
- 2. To share and discuss challenges in implementing strategies to contain AMR,
- 3. To discuss and agree on essential areas of work and technical products to be covered by the CC Network work plan for supporting the implementation of the next phase of GLASS at the global and regional levels, and
- 4. To review the CC Network activities to support WHO in fostering the implementation of AMR NAPs and laboratory strengthening in LMICs.

The three full-day meetings included seven sessions and ad-hoc Poster session: SESSION I: Opening session - Registration and Introduction, SESSION II: Plenary session - Updates from WHO HQ, CC Network & Regional Offices and requests for support, SESSION III: Parallel breakout sessions - Follow up on the progress in achieving the Target Products & planning ahead, SESSION IV: Plenary session - Moving forward: tasks for collective actions, SESSION V: Plenary session - News from countries & activities by other partners, SESSION VI: Plenary session - Moving forward: ways of working together, SESSION VII: Closing session, and POSTER SESSION.

The CC network meeting was held jointly by WHO HQ, WHO-AMRO/PAHO, and WHO CO in Argentina. In addition, the Robert Koch Institute (DEU-144), as a coordinating Centre of the Network, contributed to the preparation for the meeting.

The meeting chair was Dr. Alejandra Corso, Head of the Antimicrobial Agents Service, WHO Collaborating Centre on Antimicrobial Resistance Surveillance, Instituto Nacional de Enfermedades Infecciosas - Administración Nacional de Laboratorios e Institutos de Salud "Carlos G. Malbrán" (INEI-ANLIS), ARG-43.

3. Proceedings

3.1. SESSION I: Opening session - Welcome and introductions

Carmem L. Pessoa Silva, Unit Head in AMR Division at WHO HQ, welcomed all participants to Argentina, wished them a fruitful encounter, and introduced the speakers.

Eva Jané Llopis, PAHO/WHO Argentina representative (PWR), welcomed all colleagues from CCs and the Minister of Health, Carla Vizzotti. She recognized Argentina's leadership and multisectoral and horizontal coordination, highlighting the country's role, through Malbran Laboratory in ReLAVRA+, in supporting Caribbean countries towards laboratory capacity strengthening. She stated the turning point of AMR surveillance in a post-pandemic scenario, underpinning its importance in health care strengthening. She also emphasized the importance of access to safe antibiotics and their responsible use.

Kitty van Weezenbeek, Director for Surveillance, Prevention and Control of Antimicrobial Resistance at WHO HQ, thanked the regional office (RO) for receiving and organizing this meeting and welcomed all participants on behalf of the WHO Director-General (DG) and Assistant Director-General (ADG) WHO CO and WHO ROs (three levels of intervention). She highlighted the need for the assistance of all CCs, ROs, and HQ. She emphasized the exigency to move away from the fragmented approach to AMR, recognizing the interdependency of AMR interventions. In this regard, she referred to national action plans (NAPs) and the people-centred framework (PCF) on addressing AMR NAPs, which moves the approach to AMR from a laboratory focus to integrating all interventions and thereby optimizing CCs areas of expertise in AMR.

Carla Vizzotti, Minister of Health of Argentina, expressed that it was an honor to host this international meeting in Argentina, emphasizing its importance, especially in this post-pandemic situation where AMR has rapidly increased. She underscored the CC's efficient and extensive work, despite the lack of political support on occasion. She stated, "that it's time to double down on the promises of the global action plan to address the challenges of AMR".

Pilar Ramon Pardo – PAHO regional advisor of the Special Program on AMR– nominated Alejandra Corso, the Antimicrobial Agents Service Head, at INEI ANLIS Malbran Institute, to be the meeting Chairperson with no objections.

Alejandra Corso accepted the nomination and reiterated that AMR requires global coordination for targeted areas of intervention.

3.2. SESSION II: Plenary session - Updates from WHO HQ, CC Network & ROs and requests for support

I. WHO updates and challenges

Transitioning from a fragmented to a programmatic AMR response (Kitty van Weezenbeek)

Kitty van Weezenbeek underscored that the AMR data we use is not yet enough, and developing this data further is critical. She stated that currently AMR NAP implementation is ad hoc, fragmented, and has limited dedicated funding and weak governance. She presented a plan to transition from a fragmented response at the country level to a comprehensive, evidence-based public health response. She also highlighted the global AMR diagnostic initiative, the new GLASS 2.0 IT data platform (to be launched in 2023), and the WHO AWaRe (Access, Watch, Reserve) antibiotic book.

Van Weezenbeek was looking forward to discussing how CCs can contribute to innovation and strengthening of the programmatic AMR response, and how we can broaden the scope of these contributions to include the full package of evidence-based AMR interventions to create impacts on the people in the community where in need.

People-centred framework for AMR and NAP 2.0 (Nienke Bruinsma)

Nienke Bruinsma explained that even though 170 countries have now developed their national action plans on AMR implementation of NAPs is fragmented, ad-hoc, siloed, not costed and budgeted, and not resourced - only 24% of countries say their NAP is being implemented effectively.

A more comprehensive and programmatic approach is needed to put people and their needs at the centre of the AMR response. To address this gap for the human health sector, WHO is developing the people-centred framework (PCF) for AMR, She presented the NAP implementation handbook, highlighted six steps for sustainable implementation of AMR NAPs and additional guidance available for each step The six steps consist of: 1. Strengthen governance 2. Prioritize activities 3. Cost the operational plan 4. Mobilize resources 5. Implement prioritized activities 6. Monitor and evaluate.

The PCF is meant to provide a framework for countries that are now developing their NAP2.0 and support the integration of AMR interventions in health systems strengthening initiatives as well as fostering meaningful engagement of communities and community-led organizations in the AMR response and address inequities.

The PCF is proposed to consist of 4 pillars and 2 foundations embracing 13 AMR high-level interventions of the PCF under global consultation:

- Pillar 1 Prevention contains 3 interventions: 1) Implementation of IPC core components to mitigate AMR; 2)
 Universal access to improved WASH and waste management to mitigate AMR; and 3) Access to vaccines and expanded immunization to manage AMR
- Pillar 2 Access to essential health services contains 3 interventions: 1) AMR management included in health benefit package; 2) Uninterrupted supply of essential health products for AMR; and 3) Integrated quality AMR management services to improve patient care
- Pillar 3 Timely and accurate diagnosis consists of 2 interventions: 1) Improved laboratory and diagnostic infrastructure to enable bacteriology and mycology testing; and 2) Awareness, education and understanding of diagnostic options and diagnostic stewardship
- Pillar 4 Appropriate and quality-assured treatment covers 2 interventions: 1) Up-to-date evidence-based treatment guidelines and AMS programmers; and 2) Implementation of regulation to restrict non-prescription antimicrobial sales
- Foundation 1 Effective governance: AMR governance and accountability in the human health sector in collaboration with other sectors

• Foundation 2 Strategic surveillance & research information contains 2 interventions: 1) National AMR surveillance network to generate quality data to inform patient care and action on AMR; and 2) National antimicrobial consumption and use surveillance to inform patient care and action on AMR.

GLASS update and challenges (Carmem Pessoa)

Carmem Pessoa stated that the first phase of GLASS has concluded, and the next phase commences, which includes the expansion of the routine surveillance to new pathogens and provision of strategic information on AMR mortality and emerging health issues. The way forward was depicted as follows:

- Enhancing the representativeness and quality of AMR data
- Expansion of AMC with a particular focus on national data and community use
- Assessment of AMR impact on human health
- Surveillance of AMR in invasive fungal infections
- Enhancing the use of data at local and national levels
- Enhancing digital solutions and linking to other health data
- Improve linkages between data from the human sector with other sectors

Carmem Pessoa concluded by emphasizing the fundamental role of regional CCs in empowering ROs.

Global Laboratory AMR Diagnostic Initiative (Silvia Bertagnolio)

Silvia Bertagnolio, unit head at the AMR division at WHO HQ, supported the statement that laboratory diagnosis is crucial to understanding patients' needs and for outbreak investigation while recognizing that low-resource settings carry the most significant burden of AMR.

The aim of the WHO AMR diagnostic initiative is to bring diagnosis to the forefront of the global AMR response and to achieve equitable access to quality testing for common bacterial, fungal, and resistant pathogens through a four-building block approach:

- A strategic & operational framework
- Assessment framework
- Global AMR Laboratory Network
- Promoting Research & Innovation

II. WHO Regional Offices (ROs) request to CCs

AMRO/PAHO (Pilar Ramon-Pardo)

Pilar Ramon-Pardo described the strategies and current activities on AMR, such as ReLAVRA+ (https://www.paho.org/en/topics/antimicrobial-resistance/latin-american-and-caribbean-network-antimicrobial-resistance) and horizontal cooperation between countries such as between Argentina, CARICOM countries and PAHO that collectively explores pathogen trends and provides containment measures. Now 14 countries are supported in establishing laboratory standards and strengthening data quality and AMR diagnosis in the PAHO Region.

There are major challenges and supports needed for addressing challenges through collaborated efforts:

- Key Challenges
 - o Ensure equitable access to "new" technologies (Whole Genome Sequencing etc.)
 - o Information systems for data collection and analysis (automated systems)
 - o Fragmented information systems (AMC, PPS-Hospital Antimicrobial Use(HAMU), HAI surveillance)
 - Use of surveillance data (at different levels)
 - o Influencing the agenda of decision-makers for access to new antimicrobials (e.g., cefiderocol)
- Support needed for addressing challenges
 - o Estimating AMR burden
 - o Exploring new therapeutic options
 - o Better understanding epidemiological trends of drug-resistant pathogens
 - Monitoring progress on SDG AMR indicators
 - o Evaluating the impact of COVID-19
 - Measuring effectiveness and cost-effectiveness of interventions

AFRO (Laetitia Gahimbare: online)

Laetitia Gahimbare highlighted AMR strategies, challenges, and support needed in WHO-AFRO:

- Regional context: 70% GLASS enrollment in the region.
- Strategies: to guide member states and partners; enhance internal collaboration within AFRO; develop/update, cost and monitor NAPs; strengthen member states' skills for multisectoral collaboration; support implementation of NAP in line with GAP objectives.
- Key challenges: the limited capacity to generate, collect, analyze, and report data (only 33% of countries use human health AMR surveillance data.
- The way forward and support needed for addressing challenges:
 - Development and implementation of Regional Guide and Training modules for AST, Quality Assurance, Data analysis, and reporting
 - o Development and implementation of Regional Guide and Training modules on establishment of AMR/Use Surveillance including use of WHONET Software, GLASS platform, guidelines, and tools.
 - o Capacity building of Member States on the use of AMR/AMU data.
 - Capacity building of Member States to expand the implementation of Integrated Surveillance of AMR under the "One Health" approach.
 - o Capacity building of Member States to expand the use of molecular techniques to enhance AMR surveillance.
 - o Support to conduct national surveys on AMR, to estimated burden of AMR in the region.
 - o Capacity building of Member States on AMR Surveillance in Sexual Transmitted Diseases(STIs) and fungal diseases.

EMRO (Bassim Zayed: online)

Bassem Zayed provided an outline of the situation in EMRO. Twenty-two countries have varying economies, income levels, and political stability. Most of the countries finalized AMR NAPs, but an update is due in many. Seventeen countries are enrolled in GLASS-AMC, 14 countries established structures for national Infection Prevention Control (IPC) programs, 11 developed national IPC guidelines, and 7 completed surveys on antimicrobial prescription practices. Two countries developed national antimicrobial stewardship (AMS) policies.

EMRO requests:

- AMR Surveillance & Laboratory Support
 - o Prevalence surveys and special studies (AMR burden, AMR mortality, AMR on fungal infection. etc)
 - o Data utilization to inform policies
 - Laboratory support (capacity building, simple assessment tools, quality-assurance systems. Molecular technology)
 - o Twinning between AMR CC and AMR NRLs
- Non-Human AMR Surveillance & Laboratory Support
 - o AMR Integration into the One Health
 - o AMR/AMC/AMU tools in animal health
 - National Integrated AMR Surveillance
- AMC
 - Automation/Coding/stratification of national AMC data
 - o AMC at hospital level & in the community
- AMS
 - Capacity building at national/health-care facilities
 - o Evidence-based guidance on antimicrobial therapy modifications in high-prevalence situation
 - o Guides to simple AMS interventions (e.g. intravenous-to-oral switch)
 - o Tools to monitor compliance

EURO (Saskia Nahrgang)

Saskia Nahrgang presented updates and support needs. She highlighted the Central Asian and European Surveillance of AMR (CAESAR) network, which receives data from 16 countries/areas as of 2023. As an overview, Nahrgang started her presentation by highlighting the 10 years of CAESAR as a collaborative effort. In the early days, assessment missions, onsite technical workshops, and network meetings were done annually.

She highlighted key challenges and the way forward: building an investment case; implementation support and securing resources; targeted support in various areas of the European AMR roadmap; tools to address diagnostic stewardship; support handling coaching requests; training requests; and with AMR compass. AMR compass is a diagnostic tool to allow national AMR stakeholders to jointly assess country's needs, strengths, and readiness to implement the action areas and enablers for AMR, facilitate consensus on national priorities, facilitate national target setting, and enable countries to measure progress.

She introduced the new regional roadmap on AMR to be published in October 2023 as below:

- Contribute to implementation of the global AMR action plan
- Focus on country-level implementation and progress
- Integrate AMR into a wider approach (e.g. health security, universal health coverage, primary health care)
- Align with relevant global/regional action plans and governance structures (HIV/AIDS, Tuberculosis, Immunization agenda, Global IPC strategy, One health plan of action, Global Leaders Group on AMR, On Health High Level Expert Panel)

SEARO (Benyamin Sihombing)

Benyamin Sihombing, technical officer for AMR at WHO SEARO, presented AMR strategies, challenges, and support needed for SEARO.

- Context: In 2019, AMR cost an estimated 389.000 lives in South Asia, 84.000 of which were children under five. AMR is, therefore, a public health priority in this region.
- Current activities: analysis report on the situation on fungal pathogens; country support to strengthen AMC monitoring; development of analysis report of six rounds of Tripartite AMR Country Self-Assessment Survey (TrACSS); regional training in strengthening AMR surveillance; training leadership skill on multisectoral AMR coordination.
- Key challenges: lack of coordination and communication among relevant AMR stakeholders and lack of commitment from sub-national governments.
- The way forward: strengthen surveillance on AMR and AMC and regulatory actions across the region; proactively support countries through enhanced advocacy to make AMR a pressing health concern for the Region's 11 countries; monitor progress AMR NAP implementation, provide feedback and recommendations; capacity building of human resources and financial investment to address AMR.

WPRO (Nishijima Takeshi)

Nishijima Takeshi presented AMR strategies, challenges, and support needed on AMR, which is one of the priorities in WPRO's vision for the future.

- Strategies: strengthening AMR surveillance, antimicrobial stewardship amendment, and outbreak response. WPRO has launched a Western Pacific AMC surveillance system. AMR disease burden in the Western Pacific region is being estimated and will be published with support from CHN-120.
- Support needed: Continuing advice to WHO and participation in WHO meetings, on-site and long-term capacity-building support for AMR surveillance and laboratory systems, stewardship, consumption monitoring, and outbreak response, technical review of governments' and/or WHO documents on AMR surveillance and laboratory systems, stewardship, consumption monitoring, and outbreak response, support laboratory strengthening, including EQA, and fund availability for specific support for the Member States (e.g. tricycle project, EQA)

III. CC Network updates

Muna Abu Sin, Arina Zanuzdana, Anne Harant, Robert Koch Institute (DEU-144), currently coordinating CC for the WHO AMR CC Network.

Muna Abu Sin welcomed the new CC representatives attending the meeting. She introduced the new member CCs which have joined the network in the past two years: ARG-30, COR-11, IND-161, JPN-98, MEX-33, USA-451, UNK-323, SWE-74, and NET-42.

Arina Zanuzdana presented progress and updates on selected target products in the current work plan.

Anne Harant explained the result of a pre-meeting survey in which CCs had been asked to indicate their activities abroad. CCs were asked about past, ongoing, and planned activities per country in which they are active. She highlighted that the results would allow CCs to connect in the network at the country levels in which they are active. CCs reported most activities on AMR surveillance in the human and animal health sector, while activities in the environmental health sector are currently scarce.

3.3. SESSION III: Parallel breakout sessions - Follow up on the progress in achieving the target products & planning ahead

I. Group I: Capacity of CC network members for delivering direct technical assistance in LMICs to support NAP AMR implementation

Co-moderators: Nienke Bruinsma, Saskia Nahrgang

Notetaker: Tamarie Rocke

Nienke Bruinsma introduced herself and her team and proposed an open debate on all topics.

The current situation was presented: The major challenge is the gap between NAP development and implementation. The high-level interventions of the PCF were presented with further explanation that a concise implementation guidance will be developed for each high-level intervention providing the suggested actions to achieve the priority steps.

By using an interactive tool CC colleagues were asked if they would be interested to contribute to: the development of the concise guidance documents that are under development for each of the 13 high-level interventions; and providing technical assistance (TA) requested by countries to implement the PCF and its interventions. Going forward: Follow up with CCs to specify which interventions they would like to contribute to developing implementation guidance. A spreadsheet was sent where every CC can write their name where they have expertise and capacity to contribute to technical assistance.

In conclusion, the group was very positive toward collaborating within their areas of expertise to guide countries to prioritize and implement actions.

II. Group II: Enhancing IT solutions for data collection and use

Co-moderators: Sergey Eremin, Arno Muller

Notetaker: German Esparza

In this session, it was reported about the development of the new GLASS-IT platform and improvement of the functionalities for all stakeholders.

This platform is used for the upload of GLASS surveillance data, and it is more straightforward and user-friendly. It offers improved data upload, error reporting, and direct contact with the GLASS team.

What's coming next:

- AMC
- Individual AMR data module
- Fungal AMR data module
- EGASP/EAR

TISSA: Tripartite integrates surveillance systems on AMR and AMU.

GLASS surveys: a platform to create AMR surveys in progress, built using DHIS2.

IT tools for countries:

- WHONet®
- AMR CLOUD
- AMASS

Invited contribution of CCs would be to:

- 1. Test new platforms and provide feedback
- 2. To attend the web/based training sessions
- 3. Support WHONet® adaptation and intake in countries
- 4. Review and test the DHIS2 AMR module
- 5. Development of IT AMC/U solutions for countries.

III. Group III: Surveillance of AMR in invasive fungal infection

Co-moderators: Carmem Pessoa, Marcelo Galas

Notetaker: Grisel Rodriguez Cuns

Particular concern was voiced in this session about *Candida auris*, which emerged suddenly and has been reported worldwide. It is a highly transmissible healthcare-associated pathogen and highly resistant to antifungals.

Pilot for GLASS-Candidemia has been completed, and discussions are ongoing about full incorporation into GLASS. There are 21 countries in the global pilot and 16 in the PAHO pilot.

The group agreed they would have follow-up discussions about whether this remains a separate module or is incorporated into GLASS.

The need to bring on more CCs with fungal expertise and to create a fungal disease CC network was raised.

Moving forward:

- Strengthen fungal lab capacity for countries.
- Work on developing this as part of the new WHO AMR laboratory strategy
- Develop a Quality Control (QC) program for laboratories
- AMC and AMU in undiagnosed fungal infections

IV. Group IV: Enhancing AMC/AMU Surveillance

Co-moderators: Verica Ivanovska, Arno Muller

Notetaker: German Esparza

Items discussed:

- Overall approach to AMC and AMU surveillance
- Monitoring AMC at the country level, hospitals, and primary health care (PHC)

• The use of these data

Despite the enrollment of new CCs with expertise in the field of surveillance of AMU in the last year, this is a new area of work in the CC network and needs new expertise to cover it. AMC/AMU is a challenge and needs more coordinated actions because of its multiple actors in the process (from data collection to data use), multiple pathways for collecting data, and data availability. It was stressed that AMC surveillance and AMU monitoring are a priority.

National AMC surveillance methodology provides a standard measurement of the AMC at the country level, This contributes to understand how antimicrobials are used at country level in different components of the health system over time and detect signals of misuse. National AMC data provide relevant information on the types and quantities of use of antimicrobials in the country for policymakers, and provide standardized data on antimicrobial consumption at the global level.

Important issues raised:

- Limited capacity for data collection and management by countries because of poor IT solutions
- The importance and challenge of integrating AMR and AMC data analysis
- Flexibility of the choice of data sources depending on every country's possibilities and context.

Request to CCs from WHO HQ and ROs:

- Contribution to WHO standards and norms
- Country support capacity building/program support
- New initiatives support (i.e. PHC, use of data, global AMC performance indicators)
- Support communication and scientific publications

V. Group V: Laboratory strengthening

Co-moderators: Raghu Sriram, Saskia Nahrgang

Notetaker: Grisel Rodriguez Cuns

WHO presented the AMR Diagnostic Initiative with the overarching aims of (1) bringing diagnostics to the forefront of the global AMR response; (2) achieving equitable access to quality testing for common bacterial, fungal, and resistant pathogens.

Overall, there was a strong interest in digital health and a brief discussion on the complexity of developing an AMR catalog on diagnostics.

There was a keen engagement from the CCs and valuable feedback on the first building block of the WHO AMR diagnostic initiative, namely providing a Strategic and Operational framework with 4 strategic goals (1) ensuring equitable access, (2) establishing governance and oversight mechanisms, (3) ensuring quality and (4) optimal utilization of results of the bacteriology and mycology laboratory for patient care, IPC and AMR surveillance.

A strategic and operational framework with minimal tests, essential requirements for bacteriological and mycological diagnosis, and core competencies must be flexible and adaptable to different health system structures and local contexts based on epidemiological data.

Further input from CCs will be sought through a survey or online meeting. Individual CCs will be invited by WHO to provide a more substantial contribution to specific outputs of the AMR Diagnostic Initiative.

VI. Group VI: Enhancing AMR surveillance

Co-moderators: Sergey Eremin, Olga Tosas Auguet,

Notetaker: Tamarie Rocke

Context: A new phase of GLASS

Objectives:

- For CCs to understand the proposed Areas of Work (AoWs) for the new phase of AMR surveillance
- To discuss and collate the CC's points of view.
- To explore the interest, capacity, and expertise of the CCs in the proposed AoWs

Challenges exist when interpreting results. Surveillance is very limited in its coverage and country representativeness, including those with adequate infrastructure and those reporting data to GLASS.

A national AMR prevalence survey, its methodological principles, and four AoWs were proposed to the participants.

Even though all participants agreed on the concerns about the amount of work, products needed and how to prioritize what is the most important to get done, there was also consensus about the need to fill gaps and get operationalized surveys to obtain data to get the interest from local ministries and to raise awareness. The suggestion was that the survey needs to be simple for countries, with a basic package of information, feasible, and doable.

The objective is not to decrease AMR but to stop the increase.

Plan of action: CCs that expressed interest and capacity will be contacted to start in selected AoWs to develop a strategic plan.

At the end of the meeting, Pilar Ramon-Pardo from PAHO proposed AoWs: tools to transform AMR surveillance data into interventions; recommendations for the introduction of new technologies in AMR surveillance; definition of the minimum metadata necessary to integrate the data from different areas; development of free access software that allows rapid communication of AMR emergencies.

VII. Group VII: Training & dissemination activities

Co-moderators: Verica Ivanovska, Saskia Nahrgang

Notetaker: German Esparza

Update: Consolidation of the WHO academy course: AMR and AMU surveillance: competencies for policy and practice.

- Overview of the course structure and learning objectives
- Status of the course development progress
- Summary of the production plan

WHO academy courses are mid-career training programs for WHO staff and external learners on a single digital learning experience platform (LXP) featuring digital innovations. They are accessible via desktop, laptop, tablet, and cell phones

Verica Ivanovska and Saskia Nahrgang provided an overview of the course *AMR and AMU surveillance: competencies for policy and practice, which consists* of 20 modues (i.e., 40 hours of training). They described how each module for the WHO course is being developed as a collaborative effort. The modules script developers and reviewers involve WHO staff, consultants, and GLASS AMR CCs listed below:

- AUS-150 Doherty Institute, Australia (Part A)
- NET-89 National Institute for Public Health & Environment, the Netherlands (Part A, B)
- NOR-11 Institute of Public Health, Norway (Part A, C)
- DEU-144 Robert Koch Institute, Germany (Part A, B)
- SOA-43 National Institute for Communicable Diseases, S. Africa (Part A, B)
- SWE-66 Public Health Agency of Sweden (Coordination)
- UNK-105 Public Health England (Part B)
- USA-451 Stanford Antimicrobial Safety and Sustainability program, USA (Part A, C)
- + recent interest expressed by: ARG-43 Malbran Institute, Argentina, COR-11 INCIENSA, Costa Rica, MEX-33 SENASICA, Mexico

Then the co-moderators outlined text steps and support needed for the specific modules from CCs:

There was an immediate call of interest and CC sign up for the development/review of:

- Module 9 (Data collection)
- Module 10 (Data validation)
- Module 11 (Data analysis)
- Module 12 (Detection and early reporting of emerging/unusual AMR strains verification)

The initial timelines were discussed for the completion of the WHOA course as 2023 (for the script development) and 2024 (for the course production).

Verica Ivanovska invited the new CCs (I.e. ARG-43, COR-11, and MEX-33) to meet internally so that they can be guided for the modules' development.

Nienke Bruinsma reported on a planned global webinar series and AMR community exchange platform about NAP implementation. There is already a list of monthly AMR webinar topics related to NAP implementation at the country level organized by Nienke and NPM team.

VIII. Group VIII: One Health surveillance model with relevance to human health

Co-moderators: Sergey Eremin, Arno Muller

Notetaker: Tamarie Rocke

Global tricycle surveillance: In the early implementation of the Tricycle protocol, there was a challenge in engaging the environmental sector in integrated surveillance, the need for extensive whole genome sequencing data to understand the pathogen dissemination, and the need to convey the surveillance findings across the sectors.

The integration with other surveillance and monitoring initiatives was discussed. The experience from Tricycle could help scale up surveillance programs. JPN-97 presented the adaptation of the Tricycle to conduct surveillance in the environment.

Another point of discussion was the new surveillance sites and target specimens in all sectors and the challenges of deciding between One Health with an integrated approach.

A concern was raised about improving AMC data capture in the animal sector with routine prevalence surveys.

Regarding the update and revision of the Tricycle protocol, there was consensus about the need for sustainability through external funding for continued One Health surveillance and supporting the supply chain of reagents and other requirements. The lack of strict protocols for AMC in the animal sector and the need for leadership and commitment to a plan for funding support were highlighted.

Regarding new data collection approaches (active vs. passive surveillance), it was underscored that data from different sources and sectors are not connected, and linking these data is necessary. This was proposed to discuss with the World Organization for Animal Health (WOAH) to revise methodologies and geospatial mapping of animals.

The development of statistical sampling for different areas of One Health was also discussed.

Next steps and support needed from CCs:

- Contribution to peer review of the Tricycle implementation report
- Participation in the revision of the Tricycle protocol
- To update and disseminate training materials (including videos)
- Technical support for the implementation of the Tricycle protocol in countries, including country missions, upon WHO request

Support in logistics - essential supplies/reagents/biological material procurement and shipping

IX. Group IX: Assessment of the impact of AMR on mortality

Co-moderators: Carmem Pessoa, Pilar Ramon-Pardo

Notetaker: Grisel Rodriguez

A pathway for AMR-attributable mortality studies is lacking, which sets the route for strategically scaling up these studies to gather interpretable data that can be used nationally and globally to improve knowledge about AMR burden. Multiple challenges were identified, especially sample size, metrics, level of granularity of data and data collection (These will improve the knowledge about AMR burden).

Approaches are very different when comparing countries and methodologies. Technical assistance in planning, implementation, analysis, and reporting of these studies is also needed as part of the pathway to impact assessment.

It was reported about an advanced study on AMR mortality which is currently planned in Uruguay to test a new protocol.

Possible contributions from CCs to move forward on this project:

- Help define the pathway for AMR-attributable mortality studies, including a vision of how data may inform concrete interventions and policies at national and global scales.
- Support WHO in assisting countries in all aspects of these studies, such as planning, implementing, analysis, and reporting.
- Support WHO in data analysis from AMR-attributable mortality studies that have already been completed.
- Periodically review approaches and analytical methods to collect and translate this data into AMR health and

economic burden estimates.

CCs in the discussion manifested interest and capacity to contribute to this activity.

CCs	POSSIBLE CONTRIBUTION
ARG-30 Gustavo Marín	Support all activities except analysis
JPN-98 Ryuji Koizumi	Would be interested in possible support, but a discussion about it with another member of the CC will be required. Will try to answer it after this meeting
JPN-97 Motoyuki Sugai, Yumiko Hosaka	Would be interested in collaborating with LMIC (Low- and Middle-Income Countries) implementation and data analysis, especially in Asian countries
USA-458 Dawn Sievert, Rachel Smith	Assist in adaptation, but they need to analyze the situation before the implementation. Must help in modeling.
DEU-144 Muna Abu Sin, Arina Zanuzdana, Anne Harant	A discussion will be required about what kind of support is available at the Institute.

To assess countries on attributable mortality, representative national data is needed to understand AMR mortality and disease burden.

3.4. SESSION V: Plenary session – News from countries & activities by other partners

I. PAHO Country experiences – Round table session

Moderator: Marcelo Galas

Speakers: German Esparza (Colombia); Grisel Rodriguez (Uruguay); Genara Romero (Argentina); Tamarie Rocke (Belize); Carlos Santillán (Perú); Fernando Otaiza (Chile)

How PAHO articulates technical cooperation to address AMR in the region with countries, our PAHO offices in each of them, not government, at different levels of our regions.

• AMR Integrated surveillance:

- Argentina: Emphasized the role of the Malbran Institute as CC in the transference of standardized methodologies and supporting PAHO in implementing national AMR surveillance programs in foodborne bacteria and food-producing animals.
- Colombia: Integrated surveillance of AMR and hospitalized patients with severe infections since 2010. Experts, supported by PAHO, are integrating all information on AMR trends, AMC, agriculture, and environmental health.
- O Uruguay: WHONet® collaborations, Malbran CC supported Uruguay with an engineer and expert microbiologists as trainers in AMR to consolidate the program, with the government's support. Uruguayan and Argentinian universities worked with colleagues from the National Reference Laboratory (NRL) of MoH and PAHO to give a course about bioinformatic tools for delegates from different countries under the One Health approach for colleagues from PAHO, FAO, and OIE.
- O Peru: it was not completed, and many obstacles were received. Peru received support from CCs from Argentina and Canada for their AMR surveillance system and AMC monitoring.

• AMR emergencies and response

- o Belize: The national reference laboratory of Belize received PAHO/WHO and CC support to confirm the presence of carbapenemase type Metallo-beta-lactamase(MBL)-New Dehli MBL(NDM) in isolates of carbapenem-resistant *Enterobacterales* (CRE). The country received a GeneXpert analyzer through the Directorate General for International Partnership (INTPA) and reagents and other consumables through the Caribbean Cooperation in Health Development (CCHD) to further facilitate national AMR testing. Belize joined the Centers for Disease Control and Prevention's (CDC) Global Action in Healthcare Network Antimicrobial Resistance module (GAIHN-AR). This country network aims to strengthen the early detection and rapid containment response to emerging AMR threats focusing on CP-CREs.
- Chile: With PAHO support, projects easily advanced on rapid response to emergencies in CP-CREs. To isolate
 and study every case, the local epidemiological response is a priority. PAHO connects them to the Malbran
 Institute and CDC. IPC projects were reported to be the most complicated.

II. Examples of CC support best practices

Alejandra Corso, Malbran Institute (ARG-43), John Stelling, Brigham & Women's Hospital (USA-433), Carolien Ruesen, National Institute for Public Health and the Environment (NET-89), Olga Perovic, National Institute for Communicable Diseases (SOA-43)

Alejandra Corso (ARG-43): Described the external quality assessment (EQA) programs in Latin America and the Caribbean, their objectives, and quality indicators. The main objective of the EQA program in bacteriology and AMR is to monitor the capacity of the NRLs in bacterial identification and detection of AMR mechanisms and to train staff in the evolution of carbapenemase detection.

EQAs: Difficulties were presented in the region's identification and antimicrobial susceptibility tests and the opportunities for improvement with internal quality control and continued education. EQA implementation contributed to implementing new methodologies in NRLs for accurate and timely diagnosis of emerging AMR mechanisms.

Carolien Ruesen (NET-89): Presented the impact of CC's IT support on national surveillance within CAESAR. In the beginning, there was no national surveillance system, all paperwork, and no database. The first step was improving data collection. WHONet® was functional but intimidating for first-time users. Solution: electronic Isolate Record Form (eIRF) software as a first step in national surveillance. Examples of its use are Moldova, Kosovo, Georgia, and Ukraine.

John Stelling (USA-433): Described the impact of CCs' IT support on national surveillance and reported that a historical review of AMR. He highlighted Ministry of Health is responsible for AMR awareness.

It was also noted that the Fleming Fund supports various projects across AMR, namely the Captura project; MAAP project; RADAAR project. Furthermore, the Fleming Fund-WHONet® strategic alignment grant was mentioned, which involves training, technical support, and new software development. Other current projects are COMBAT-AMR (Pacific Island countries), CDC ASM *Bordetella pertussis* project (Brazil and Mexico, expansion in Latin America), and WHO GLASS-EGASP.

Olga Perovic (SOA-43) introduced the WHO National Institute for Communicable Diseases (NICD) EQA programs in the African Region. Strengthening the emergency preparedness of national laboratory systems requires strong laboratory capacity. Olga Perovic described the performance evaluation applied to every bacteriology laboratory through two surveys. The laboratory performance in bacteriology (enteric, general bacteriology, and yeast) was graded based on the Clinical Microbiology Proficiency Testing (CMPT) model.

NICD is a consortium partner for the EQA for Africa (EQAFRICA) program. The United Kingdom-based Fleming Fund has allocated funding to various grant schemes (fellowship, country, regional) to tackle the emergence of AMR in low- and middle-income countries. Initially targeting 12 priority countries across Southern, Eastern, and Western Africa, the program has expanded its activities to central Africa with the inclusion of Cameroon and Gabon to the recently approved portfolio of grants led by the African Society for Laboratory Medicine (ASLM). Currently, ASLM leads the consortium for mapping AMR and AMU data in Africa (MAAP), the EQAFRICA and the Fleming Fellowship in Tanzania. It is also engaged in the regional grant on workforce development for AMR.

III. Stakeholders mapping and activities focusing on AMR/AMU surveillance

Monica Lahra, New South Wales Ministry of Health (AUS-72)

Monica Lahra began her presentation by stating that TP13 work is under development and that all feedback and inputs were welcomed.

The objectives of this project are to:

- Identify high-quality, aligned activities to support GLASS across settings.
- Avoid duplication of work to minimize waste and optimize the use of resources.
- Enhance access to support awareness of regional projects, programs, and skills.
- Increase awareness of AMR/AMU & GLASS, such as activities inside and outside the WHOCC AMR network.
- Map sources and resources for awareness and ongoing gap analysis.
- Enable capitalization of available assets to maximize progress and build capacity.

Its utility is supporting WHO, augmenting network efficiency, and facilitating program development. This mapping design is focused on AMR surveillance, mapped to the region and by country, quality is given, and the future One Health scope.

The systematic reviews and stakeholders' input are taken into the TP13 custom database, and as a result, an annual report and a live document are planned to be generated. This TP 13 outputs a database of Sources and Resources for progressing partnerships to move on to funding, research, laboratory services, and education.

Next steps:

- Ongoing data collection
- Network surveys
- Data analysis and assembly
- Country catalog
- Regional directory

3.5. SESSION VI: Plenary session – Moving forward: ways of working together

CC Network modus operandi

Insik Kong, WHO HQ, Arina Zanuzdana & Anne Harant, Robert Koch Institute (DEU-144)

Insik Kong, WHO HQ, presented monitoring the work plan implementation in the Network.

The network is a collaborative mechanism via a multilateral approach among WHO and WHO CCs: encouraging and promoting formal and informal networking of WHO CCs around thematic areas to increase synergy and strengthen collaborative and strategic planning.

The dynamics of this Network is the ongoing process of matching need, demand, and supply to address AMR. The mission of the Network is to assist WHO countries, particularly low-income countries, in building the capacity to develop and implement AMR surveillance.

A new revised frame of the work plan was suggested. Key activities are to develop an agreed plan with implementation and monitoring of said plan to enhance collective actions.

Next steps:

- Finalize the Network's work plan 2023-24, based on the agreed preliminary draft from nine breakout sessions and the plenary sessions, by May 2023.
- Implement and monitor the work plan with the suggested frame and guides.

Arina Zanuzdana reflected on the modus operandi of the WHO AMR Surveillance Network during the past years. The work plan is revised regularly with ROs and HQ and coordinated with the GLASS team and CCs (on a rotational basis). Communication with CCs is vital via email, Microsoft Teams®, newsletters, and other platforms. The focus will be on strengthening the Network through effective means of coordination and communication, enabling more exchange between members, regular communication, promoting the use of network outposts, and sharing a common vision.

Anne Harant presented about communication channels for the network. Microsoft Teams® will be the essential tool to exchange information and collect quick responses to continue communication after this face-to-face meeting. The network webinar series will keep the engagement momentum and "reduce the distance" between members of all CCs. It was proposed to write a journal article to define better and showcase and communicate the profile of the Network with the working title "An international network of WHO collaborating centres to improve surveillance of AMR and use worldwide."

3.6. SESSION VII: Closing session

Closing remarks

The Chair, Alejandra Corso highlighted that it was an honor to host this meeting and have shared this time with experts and leaders from around the world who share a common goal: combat AMR and preserve global health. She commended the network as a unique platform to strengthen AMR surveillance and quality assessment, improve laboratory capacity and data sharing, support research and innovation, and enhance global and regional coordination and collaboration. On behalf of the Argentinian Ministry of Health and the scientific community, she reinforced the commitment to fight AMR

Carmem Pessoa thanked all participants, organizers, and hosts. She appreciated the support from CCs, who represent leading AMR experts and networks worldwide. Pessoa recognized that all meeting objectives were successfully achieved and acknowledged it as a milestone towards encouraging more countries to join GLASS. She underscored the need for data quality that serves as evidence to inform strategic action on AMR.

3.7. POSTER SESSION

In total, 34 posters were submitted for the poster session. Each CC headed their poster with the short identifier and name of their CC as well as the CC's location and hosting institute/unit. Furthermore, each poster detailed the CC's field of expertise and ongoing and planned activities. Eventually, most CCs also showcased examples of their recent work. All 34 posters were displayed in the coffee break area and inspired conversations before and in between sessions.

4. Prioritized areas of work and target product

(Session IV: Plenary session – Moving forward: tasks for collective action)

Prioritized areas of work and target products were drafted based on plenary session IV and the collective discussions during the nine breakout sessions. These will be core components of the revised work plan of the Network, which will be finalized, including timeline, key activities, target product leads and contributors, and WHO technical focal points.

Areas of Work	Target Product
1. Developing and implementing a people-centered approach to evidence-	1.1. Development of Implementation Guidance
based NAPs 2.0	1.2. Map creation of CCs by different technical areas
2. Enhancing IT solutions for AMR, AMC/AMU data collection and use	2.1. Development of a new IT platform
ANIC/ANIO data concetion and use	2.2. Share IT knowledge
	2.3. Map existing IT solutions in countries in LMICs
3. Improving AMR surveillance in	3.1. Development of SOP for GLASS based on the protocol "GLASS
invasive fungal infection	early implementation protocol for inclusion of Candida spp."
	3.2. Development of fungal laboratory QA
	3.3. Provision of the country support
4. Consolidating national AMC	4.1. Revision of the National AMC methodology to include performance
surveillance	indicators
	4.2. Development of guide on data collection at wholesales/distribution level for National AMC purposes
5. Establishing surveillance of	5.1. Development of guidance on surveillance of AMC/AMU in PHC
AMC/AMU in primary health care	5.2. Development of a menu of surveillance methods for AMC in PHC/Community (CAMC)
6. Strengthening global and country support for AMC/AMU surveillance	6.1. Map creation of expertise of CCs by prioritized technical areas of AMC/AMU surveillance
	6.2. Support countries in conducting NAMC, HAMC and PPS on AMU
7. Facilitating access to early quality	7.1. Development of a Strategic and Operational framework
diagnosis for AMR through laboratory strengthening and links to primary and	7.2. Creation of an Assessment Framework
universal health care	7.3. Establishment of a Global AMR Laboratory Network
	7.4. Promotion of research and innovation in AMR diagnostics
	7.5. Provision of country support

8. Developing, piloting, and implementing	8.1. Development of macro-level indicators to inform uses of data
prospective national AMR surveys, including	8.2. Epi-reviews to evaluate and strengthen surveillance
reporting on SDG indicators	8.3. Provision of technical assistance for AMR prevalence surveys
SDO Indicators	8.4. Provision of continuous review of methods and analytical approaches
9. Utilizing WHO Academy course for	9.1. Development of WHO Academy Course of AMC programme (Part C)
strengthening national capacity for AMR, AMC/AMU surveillance	9.2. Development of WHO Academy Course of Introduction (Part A) and AMR surveillance (Part B)
	9.3 Sustain WHO Academy Course
10. Consolidating One Health AMR surveillance with relevance to human	10.1. Revision of Tricycle protocol
health	10.2. Provision of country support
11. Estimating AMR burden of disease	11.1. Development of Pathway for AMR-attributable mortality studies
	11.2. Counduct of A systematic review of approaches and analytical methods used to collect and translate these data into estimates of AMR's health and economic burden
	11.3. Provision of global and country support
12. Detecting EID on AMR	12.1. Development of guidance on early detection and information sharing of unusual types of AMR
13. Collaborating efforts on strategic planning and expanding networks	13.1. Development of database of Sources and Resources for progressing partnerships (funding, services, education) - Mapping stakeholders and activities focusing on AMR/AMU surveillance
	13.2. Establishment of internal Network webinar series
	13.3. Published position paper of the Network 'An international network of WHO Collaborating Centres to improve surveillance of antimicrobial resistance and use worldwide'

5. CONCLUSIONS and NEXT STEPS

Conclusions

The 4th Network meeting was the first in-person meeting to restore proactive multilateral interactions within the Network in the COVID-19 pandemic. Due to COVID-19 pandemic, there was no meeting in 2020-21. A few online short meetings (in September 2021 and February 2022) were held to follow up on the work plan activities planned in February 2019, but limited contributions to implementing the work plan from members of the Network because of the high demand for IPC experts in each CC, who urgently had to involve in COVID-19 response.

The meeting focused on updating prioritized support from the Network to WHO on AMR surveillance and laboratory strengthening with a programmatic approach strategically aligned with the people-centred framework to address AMR in the human health sector. It highlighted the need for continued support and commitment to

- strengthening the national surveillance systems
- country participation, global collaboration, and coordination between partners
- further improvement of data quality and representativeness
- and data translation to inform policy and interventions.

WHO drafted the cores of the work plan with reference to the results of 9 breakout sessions and collective discussion in the plenary session. WHO has 13 prioritized areas of work and aligned 35 target products in 2023-2024(25) based on global and regional contexts on AMR. Regarding areas of work, WHO expanded the scope for a programmatic approach to address AMR by creating a new area of work, 'Developing and implementing a people-centred approach to evidence-based NAPs 2.0'. Also, WHO strengthened an area of work, 'Collaborating efforts on strategic planning and expanding networks' through establishing of internal Network webinar series, which enhances the Network's accountability and capability for more efficient and effective contributions in the future. WHO will keep the principle of the work plan in mind 'optimize doable work plan, minimize unmanageable work plan, mobilize resources in a sustainable way, and maximize impacts of collective actions on the people in the community'

Next steps

WHO will consolidate and finalize the revised work plan per the WHO's prioritized tasks in 2023-2024(25) in May-June 2023. All members of the Network will be asked to get involved in the revised work plan as target product lead and contributor. With the finalized work plan, WHO and Robert Koch Institute (DEU-144), as a coordinating centre of the Network, will organize the online Network meeting to share the work plan and next steps in detail accordingly. Each group of area of work or target product will be able to have separate meetings as the designated lead or WHO technical focal point could suggest for the implementation of the work plan.

For monitoring the work plan implementation in the Network, WHO will provide the Network with the monitoring frame consisting of 'progress status', 'details of activity performed', and 'challenges and solutions(optional).

The next Network meeting will be held in 2025 to set up the work plan for 2025-2026(27).

Annex

1. Meeting agenda

4th Meeting of the WHO AMR Surveillance and Quality Assessment Collaborating Centres Network 21-23 March 2023, Buenos Aires, Argentina

(VENUE: Tirso de Molina Hall, Hotel Melia Buenos Aires)

TUESDAY, 21 MARCH 2023 (DAY 1)

SESSION I: Opening session - Registration and Introduction Simultaneous translation	
08:30-09:00	Registration
09:00-09:45	Welcome and introductions
	Welcome remarks
	Opening remarks
	Group Photo
	Meeting attendance, format, and objectives
	(Carmem Pessoa) enary session - Updates from WHO HQ, CC Network & Regional Offices and requests for air: Prof. Alejandra Corso) Simultaneous translation
	enary session - Updates from WHO HQ, CC Network & Regional Offices and requests for
support (The Ch	enary session - Updates from WHO HQ, CC Network & Regional Offices and requests for air: Prof. Alejandra Corso) Simultaneous translation
support (The Ch	enary session - Updates from WHO HQ, CC Network & Regional Offices and requests for air: Prof. Alejandra Corso) Simultaneous translation WHO updates and challenges:
support (The Ch	enary session - Updates from WHO HQ, CC Network & Regional Offices and requests for air: Prof. Alejandra Corso) Simultaneous translation WHO updates and challenges: SPC Dept (Kitty van Weezenbeek)
support (The Ch	enary session - Updates from WHO HQ, CC Network & Regional Offices and requests for air: Prof. Alejandra Corso) Simultaneous translation WHO updates and challenges: SPC Dept (Kitty van Weezenbeek) People-centred framework for AMR and NAP 2.0 (Nienke Bruinsma)
support (The Ch	enary session - Updates from WHO HQ, CC Network & Regional Offices and requests for air: Prof. Alejandra Corso) Simultaneous translation WHO updates and challenges: SPC Dept (Kitty van Weezenbeek) People-centred framework for AMR and NAP 2.0 (Nienke Bruinsma) GLASS update and challenges (Carmem Pessoa)
support (The Ch 9:45-10:30	enary session - Updates from WHO HQ, CC Network & Regional Offices and requests for air: Prof. Alejandra Corso) Simultaneous translation WHO updates and challenges: SPC Dept (Kitty van Weezenbeek) People-centred framework for AMR and NAP 2.0 (Nienke Bruinsma) GLASS update and challenges (Carmem Pessoa) Global AMR Diagnostic Initiative (Silvia Bertagnolio)

	Field Security Associate: Juan Marcos Bosco
	Field Security Associate: Patricia De Valenzuela
11:00-12:15	WHO Regional Offices (RO) request to CCs:
+ Online	AMRO/PAHO (Pilar Ramon-Pardo)
	AFRO (Laetitia Gahimbare: online)
	EMRO – (Bassim Zayed: online)
	EURO (Saskia Nahrgang)
	SEARO (Benyamin Sihombing)
	WPRO (Nishijima Takeshi)
	Q&A – 15 min
	https://paho-org.zoom.us/j/85761085832?pwd=Zk1HKzkvalFSeHl6ZjRLZk1nUU9lUT09
	(Meeting ID: 857 6108 5832, Access code: 613705)
12:15-13:00	CC Network updates
	Muna Abu Sin, Arina Zanuzdana, Anne Harant, Robert Koch institute (DEU-144)
13:00-13:10	Description of breakout sessions dynamics
	Carmem Pessoa
13:10-14:10	Lunch
	arallel breakout sessions - follow up on the progress in achieving the target products & planning rators of WHO HQ/RO in each group)
14:10-16:30	Group I: Capacity of CC network members for delivering direct technical assistance in LMICs to support NAP AMR implementation
	(Co-moderators: Nienke Bruinsma, Saskia Nahrgang)
14:10-16:30	Group II: Enhancing IT solutions for data collection and use
	(Co-moderators: Sergey Eremin, Arno Muller, John Stelling)
14:10-16:30	Group III: Surveillance of AMR in invasive fungal infection
	(Co-moderators: Carmem Pessoa)
15:00-	Coffee break / Poster Session in the corridor
16:30-	Visit to Malbran Institute (Optional)
	https://www.argentina.gob.ar/salud/anlis

WEDNESDAY, 22 MARCH 2023 (DAY 2)

SESSION III (Cont.): Parallel breakout sessions - follow up on the progress in achieving the target products & planning ahead		
(Co-moderators of WHO HQ/RO in each group)		
09:00-12:30	Group IV: Enhancing AMC/AMU surveillance	
+ Online	(Co-moderators: Verica Ivanovska, Rojas Cortes, Edgard, Arno Muller)	
	https://paho-org.zoom.us/j/85761085832?pwd=Zk1HKzkvalFSeHl6ZjRLZk1nUU9lUT09	
	(Meeting ID: 857 6108 5832, Access code: 613705)	
09:00-12:30	Group V: Laboratory strengthening	
	(Co-moderators: Raghu Sriram, Saskia Nahrgang)	
09:00-12:30	Group VI: Enhancing AMR surveillance	
	(Co-moderators: Sergey Eremin, Olga Tosas Auguet)	
10:20-10:40	Coffee break / Poster Session in the corridor	
12:30-13:30	Lunch	
13:30-17:00	Group VII: Training & dissemination activities	
	(Co-moderators: Verica Ivanovska, Saskia Nahrgang)	
13:30-17:00	Group VIII: One Health surveillance model with relevance to human health	
	(Co-moderators: Sergey Eremin)	
13:30-17:00	Group IX: Assessment of the impact of AMR on mortality	
	(Co-moderators: Carmem Pessoa)	
14:50-15:10	Coffee break / Poster Session in the corridor	
17:00	Meeting adjourns	
19:00-	Social dinner (Optional)	
	El Mirasol: https://www.elmirasol.com.ar/es/local/puerto-madero-0	

THURSDAY, 23 MARCH 2023 (DAY 3)

SESSION IV: Plenary session - Moving forward: tasks for collective actions		
(The Chair: Prof. Alejandra Corso) Simultaneous translation		
08:30-10:50	Feedback from the breakout sessions I-III, IV-VI, VII-IX	
10:50-11:10	Coffee break / Poster Session in the corridor	
11:10-12:30	Continuation Feedback and consolidation	
12:30-13:30	Lunch	
SESSION V: Plena Corso) Simultaneous tra	ary session – News from countries & activities by other partners (The Chair: Prof. Alejandra	
13:30-14:00	PAHO Countries experiences – Round table session	
	(Moderator: Marcelo Galas, speakers: German Esparza, Colombia; Grisel Rodriguez, Uruguay; Genara Romero, Argentina; Tamarie Rocke, Belize; Carlos Santillan, Peru; Fernando Otaiza, Chile)	
14:00-14:30	Examples of CC support best practices	
	(Mabran Institute (ARG-43), John Stelling, Brigham & Women's Hospital (USA-433), Carolien Ruesen, National Institute for Public Health and the Environment (NET-89), Olga Perovic, National Institute for Communicable Diseases (SOA-43)	
14:30-15:00	Stakeholders mapping	
	Monica Lahra, New South Wales Ministry of Health (AUS-72)	
15:00-15:20	Coffee break / Poster Session in the corridor	
SESSION VI: Pler	nary session – Moving forward: ways of working together	
(The Chair: Prof. Alejandra Corso) Simultaneous translation		
15:20-16:00	CC Network modus operandi	
	(Insik KONG, WHO-HQs, Arina Zanuzdana & Anne Harant, Robert Koch Institute DEU-144)	
SESSION VII: Clo	SESSION VII: Closing session	
(The Chair: Prof. Alejandra Corso) Simultaneous translation		
16:00-16:30	Closing remarks	

2. List of participants

1) Members of the Network: 58 members of 25 CCs from 15 countries

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	7. Patricia Galarza
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2) WHO Regional/Country Offices: 19. 17 staff from 4 ROs, 2 staff from 2 ROs in virtual at plenary session II

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3) WHO Headquarters: 10 staff from SPC Department in AMR Division

3. Abstracts for nine breakout sessions

BREAKOUT SESSIONS GROUP I - Capacity of CC Network members for delivering direct technical assistance (TA) in LMICs to support NAP AMR implementation

FOCAL POINT: Nienke Bruinsma, WHO/HQ/AMR/SPC/NPM

BRIEF BACKGROUND

Seven years since WHO Member States endorsed the Global Action Plan (GAP) on AMR in 2015 [6], 170 countries have now developed a national action plan (NAP) on AMR. However, there is a large gap in the actual sustainable implementation of NAPs. This is evident from the latest Tracking AMR Country Self-Assessment Survey (TrACSS) – only 24% of countries are actively implementing and monitoring their NAPs.

In order to effectively and sustainably address AMR, a more comprehensive and programmatic approach is needed. While the GAP on AMR provides high-level multisectoral strategic objectives to tackle AMR, there is a need for a sector-specific evidence-based approach that addresses the complex drivers of AMR, recognizes the interdependency of interventions to overcome these drivers, and puts people and their needs at the centre. To address this gap in the human health sector WHO has developed a **people-centred framework for addressing AMR** (PCF).

The PCF aims to address the complex challenges people face when accessing health services along their AMR journey, from prevention through diagnosis to the appropriate treatment of infections.

The framework also aims to accelerate the sustainable implementation of evidence-based human health AMR interventions, mainstreamed in wider health system strengthening efforts through universal health coverage (UHC) and primary health care (PHC), implementation of the International Health Regulations (IHR), and pandemic preparedness and response initiatives.

Ultimately, the PCF strives to reduce the negative impact of AMR on patients in terms of morbidity, mortality, and disability while leaving no one behind and ensuring equitable access to preventive services, timely and quality diagnosis, treatment, and care.

With many countries looking to revise their NAPs on AMR and given the urgent need to accelerate sustainable implementation, this framework provides a core set of 13 high-level priority interventions that can inform the development and revision of NAPs (2.0) and will be part of the NAP2.0 guidance package.

POINTS for DISCUSSION

- Introduction to the PCF and the 13 high-level interventions to support countries with effectively and sustainably addressing AMR in a more comprehensive and programmatic approach (to be incorporated into NAPs 2.0).
- Understanding the ability, feasibility and interest of CC Network members to contribute to:
 - i) the development of the concise guidance documents that are under development for each of the 13 highlevel interventions; and
 - ii) providing technical assistance (TA) requested by countries to implement the PCF and its interventions.
- The interest of WHO CCs to support the development of a global or region-specific roster/database of experts to deliver TA. Provide an example of how this could be set up based on the International Health Regulations (IHR) Joint External Evaluation (JEE) expert database.
- How to further promote the already existing <u>AMR community exchange</u> for documentation and exchange of best practices.

- Exploring the opportunities and WHO CC experiences of mainstreaming AMR interventions into wider health systems strengthening efforts, including PHC and pandemic preparedness and response initiatives.
- Exploring interest of WHO CC in addressing cultural drivers of health-seeking and health-providing behaviors, which affect the management of drug-resistant infections and patient outcomes.

KEY QUESTIONS/REQUESTS to CCs

- Do CC Network members or their institute already provide broader TA to countries for the implementation of NAPs (beyond AMR/AMU surveillance)? To which of the high-level interventions have the CCs already provided TA?
- Are CC Network members able/interested in providing broader technical capacity in delivering direct TA, including twinning initiatives to countries? To which of the high-level interventions could CCs potentially contribute TA?
- Would the CC Network members have the financial capacity for TA delivery?
- Which models should be considered to coordinate country requests and delivery of TA?
- What would be the availability of experts from CCs to become part of a roster of experts region-specific / global database?

TARGET OUTPUT:

- CC Network understanding of the WHO people-centred framework
- Mapping of CC Network members already providing TA to countries for the implementation of NAPs
- Mapping of potential contributions from CC Network members to providing TA to countries for the implementation of NAPs

Appendix: Reference materials

- 1. WHO people-centred framework for addressing AMR in the human health sector.
- 2. NAP2.0 guidance package, NAP AMR implementation handbook.
- 3. AMR community exchange, the online platform

BREAKOUT SESSIONS GROUP II: Enhancing IT solutions for data collection and use

FOCAL POINTS: Sergey Eremin and Arno Muller WHO HQ/AMR/SPC/SEL

BRIEF BACKGROUND

Antimicrobial resistance is recognized as a major public health and economic threat. Yet, the evidence base for the AMR response is still weak, especially in low- and middle-income countries. Hence, relevant, specific, reliable, and comparable information needs to be collected to assess and monitor the AMR situation and inform and evaluate national and global policies and interventions. Information Technologies (IT) can greatly facilitate and benefit the collection, sharing and use of data. Therefore, IT tools are introduced at all data generation steps, including collection, collation, validation, storage, analysis and publication. They may contribute to the standardization and scalability of surveillance systems at all levels, both nationally and globally. IT solutions for AMR/AMU surveillance are specific in terms of required functionalities. They rely on existing databases or health information systems to be fully functional (from data capture to data publication). IT solutions, if well designed, facilitate data recording, reporting and utilization by healthcare workers at all levels of the health system, as well as relevant stakeholders such as policymakers and WHO. Digital solutions are not only relevant to the surveillance of AMR and AMU, but will also benefit other AMR related health systems functions, such as supply chain management and diagnostic processes.

GLASS uses a few IT solutions. Some solutions, such as WHONET, target hospitals and national centres. At the same time, the GLASS IT platform targets national focal points and WHO staff at the 3 levels of the organization. Some tools focus on AMR, others on AMC or AMU, and some are cross-domains. WHO seeks support to ensure the right tools are used at local and country levels to generate accurate information for policymakers at different levels.

POINTS for DISCUSSION

- Development of the new GLASS-IT platform and improvement of the functionalities for all stakeholders (countries, WHO and others)
- Further development of the new online GLASS dashboard (interactive database)
- How to improve existing IT tools for surveillance of AMR (e.g., WHONET, DHIS2 AMR module) and their use at the country level
- Review of existing tools for management/surveillance of medicines/antimicrobials use and how IT tools for surveillance of antimicrobial use can be plugged into the medicines IT solutions

KEY QUESTIONS/REQUESTS to CCs

- Test of the new GLASS-IT platform: AMR-individual/AMC/EAR
- Support WHONET adaptation and intake in countries
- Review and test the DHIS2 AMR module

TARGET OUTPUT: Agreeable lists of prioritised deliverables within a defined time frame (i.e., 2023 – 2025)

BREAKOUT SESSIONS GROUP III: Surveillance of AMR in invasive fungal infection

FOCAL POINT: Sergey Eremin WHO HQ/AMR Division/SPC/SEL

BRIEF BACKGROUND

The Global Antimicrobial Resistance Surveillance System (GLASS) aims to support the implementation of the Global Action Plan on Antimicrobial Resistance (GAP-AMR) by promoting and strengthening standardized antimicrobial resistance (AMR) surveillance worldwide. Recognizing the growing threat of resistant fungal infections, GLASS also started a global collaborative effort to compile available data on antifungal-resistant infections, focusing on invasive fungal bloodstream infections (BSIs) caused by Candida species, since this is the most common type of invasive fungal disease.

One of the major limitations in addressing the threat of antifungal-resistant fungi is a lack of data at the global level: few countries have effective surveillance systems for fungal diseases, and consequently, statistics on their incidence, resistance, and related burden of disease are limited; also, accurate identification and antifungal susceptibility testing (AFST) of *Candida* spp. poses major challenges as many laboratories worldwide lack this capability. WHO would benefit from support from partners to overcome these challenges in order to generate representative AMR fungal surveillance data at the country level, as well as progressively adding new fungal surveillance targets with standardized, comparable, and validated data on antifungal resistance.

POINTS for DISCUSSION

- Full incorporation of fungal AMR national data into GLASS
 - Lessons learned during the piloting of Candida bloodstream infections surveillance protocol and aspects to be improved
 - Practical requirements for generating and submitting data, including capacities of clinical laboratories participating in the national AMR surveillance system for identification and performing antifungal susceptibility testing of *Candida* spp
 - o Country implementation: required support from WHO (3 levels) to WHO CCs
- PAHO experience and integrations in routine AMR surveillance.
 - o Lessons learned
 - o Interactions with GLASS regarding data submission and validation

KEY QUESTIONS/REQUESTS to CCs

- Areas of interest/expertise from the CC
- Contribution to WHO documents
- Country support capacity building/program support
- Support new initiatives (e.g., support WHO pilots)

TARGET OUTPUT

- Good understanding by the CCs of the WHO current activities on AMR fungal surveillance
- Initial mapping of expertise of the CCs in AMR fungal surveillance
- Initial mapping of capacity among the CCs for country support of AMR fungal surveillance
- Consensus on preliminary target deliverables for the GLASS CC network

Appendix:

1. GLASS early implementation protocol for inclusion of Candida spp.

BREAKOUT SESSIONS GROUP IV: Enhancing AMC/AMU surveillance

FOCAL POINTS: Arno Muller and Verica Ivanovska WHO HQ/AMR/SPC/SEL

BRIEF BACKGROUND

The misuse or overuse of antimicrobials is the most important driver of the development of AMR and medicines' adverse effects. On the other hand, many resource-restricted countries have low rates of use of antimicrobials due to poor access to appropriate medicines. Thus, measuring the use of antimicrobials is important in developing and evaluating policies, regulations and interventions to ensure the appropriate use of and access to quality antimicrobials. WHO has developed protocols and guidance for countries to measure their use of antimicrobials and has supported countries in setting up national surveillance systems for antimicrobial consumption. The national AMC monitoring was incorporated into the WHO Global Antimicrobial Resistance and Use Surveillance System (GLASS) in 2020. For the first time, the 2022 GLASS Report displayed national AMC data, gathering information from 27 countries.

Globally, expertise on surveillance of the use of medicines is scarce. WHO is working on developing basic tools for countries to initiate or consolidate surveillance programs to allow them to retrieve reliable and comparable data on the use of antimicrobials. WHO GLASS is currently focusing on monitoring antimicrobial consumption as a proxy for antimicrobial use. Efforts will be deployed to enhance national AMC surveillance and establish AMC monitoring in the community and primary healthcare. In this regard, WHO GLASS seeks technical support from the CC network for the development of standards (e.g., surveillance protocols, guidance, IT solutions) to enhance countries' capacities to monitor, report and act upon AMC data. In addition, countries will be supported to collect standardized information on antimicrobial usage (AMU) with focus on countries where AMC data suggest over/misuse.

POINTS for DISCUSSION

- Consolidation of national AMC monitoring, including
 - o Performance indicators & implementation indicators
 - Disaggregation of national data and minimum data source level (wholesales/distributors)
- Consolidation of monitoring in hospital settings:
 - o Routine hospital AMC monitoring: practical implementation and minimal requirements
 - o Capacity building
- Discussion on monitoring in community/primary care settings:
 - How to best monitor AMC in community settings?
- Country support for AMU capacity building in the context of (sub)national surveillance programs
- Integration of the antimicrobial use surveillance in the broader rational use programs

KEY QUESTIONS/REQUESTS to CCs

- Contribution to WHO standards and norms
- Country support capacity building/program support
- Support new initiatives (e.g., support WHO pilot new AMC surveillance approaches)
- Communication and scientific publication

TARGET OUTPUT: Agreeable lists of prioritized deliverables within a defined time frame (i.e., 2023 – 2025)

- Good understanding by the CCs of the ongoing WHO work on surveillance of the use of antimicrobials
- Initial mapping of expertise of the CCs in the different areas of surveillance of the use of antimicrobials

- Consensus on preliminary target deliverables for the GLASS CC network:
 - Support to the review of the National (and hospital) AMC methodology
 - New initiatives
 - Global performance indicators on surveillance of national AMC
 - AMC Surveillance in the community and primary healthcare
 - Use of data for policy action

Appendix: Reference materials

GLASS methodology for surveillance of national antimicrobial consumption

GLASS guide for national surveillance systems for monitoring antimicrobial consumption in hospitals

BREAKOUT SESSIONS GROUP V: Laboratory Strengthening

FOCAL POINT: Raghu Sriram WHO HQ/AMR/SPC/CRS

BRIEF BACKGROUND

The Antimicrobial Resistance (AMR) Diagnostic Initiative aims to strengthen bacteriology and mycology diagnostic capacity, laboratory systems and service delivery for identifying and characterizing common bacterial and fungal pathogens and susceptibility testing with a specific focus on countries with limited resources or capacity.

The goals of the AMR Diagnostic Initiative are:

- To bring diagnostics to the forefront of the global AMR response to support patient management, antimicrobial stewardship (AMS) initiatives, Infection Prevention and Control (IPC) measures, outbreak investigations, and to strengthen routine surveillance.
- To achieve equitable access to quality testing for common bacterial, fungal, and resistant pathogens at all health system levels and in the community.

To achieve these goals, the AMR Diagnostic Initiative commits to four building blocks:

- 1. A strategic and operational framework for strengthening bacteriology and mycology diagnostic capacity, laboratory systems and service delivery.
- 2. Standardized assessment tools for monitoring and reporting global capacity on AMR, bacteriology, and mycology diagnostics and laboratory systems.
- 3. A Global AMR Laboratory Network, including laboratories designated by WHO at national, supranational, and specialized levels to strengthen diagnostic capacity.
- 4. Promoting research and innovation in AMR diagnostics.

POINTS for DISCUSSION

- Strategic considerations aligned with how the CCs can support each of the building blocks

KEY QUESTIONS/REQUESTS to CCs

- Building block 1- Development of the strategic and operational framework

 Contribute to technical meetings, support facilitation of technical discussions, and in drafting reports, ad hoc Review SOP, training and educational material developed by WHO (operational framework).
- Building block 2- Standardized Assessment tools for monitoring and reporting global capacity
 Support WHO in the development of the assessment process including by preparation and validation of checklists
- Building block 3 Global AMR Laboratory network
 - Describe the function, scope, role, tasks, and responsibilities of different levels (National, supranational and specialized) of the laboratories in the network
 - Support WHO in the lab designation. Participate in the laboratory capacity assessment and subsequent capacity building to the assessed laboratories based on the identified gaps.
 - Assist WHO in the development of the WHO global AMR Lab Network (Mycology)
- Building block 4 Research and innovation in AMR diagnostics

Assisting in performing a landscape analysis of available digital solutions to simplify the interpretation and reporting of susceptibility testing. In case found suitable to carry out piloting/testing of innovative laboratory solutions. This includes defining validation criteria, field validation, write up and dissemination of results.

Other areas of support

- O Support the development of national EQA guidelines to help reference laboratories within countries develop the capacity to produce and distribute EQA panels to bacteriology laboratories.
- Assist in the identification of AMR diagnostics for incorporation in WHO Essential Diagnostic List (EDL) and in the WHO procurement catalogue.
- o To support AMR surveillance, provide structured training to selected National Reference Laboratories on molecular tests, including WGS and bioinformatics, to build upon existing capacity.
- Support the MedMon Survey of pricing and availability of essential in-vitro diagnostics for AMR in LMIC

TARGET OUTPUT: Agreeable lists of prioritized deliverables within a defined time frame (i.e., 2023 – 2025)

(Every new TP should have a short description to be developed during the breakout session - see annexe).

Appendix: WHO Antimicrobial Resistance Diagnostic Initiative (Draft)

BREAKOUT SESSIONS GROUP IV - Enhancing AMR Surveillance

FOCAL POINTS: Sergey Eremin and Olga Tosas Auguet, WHO/HQ/AMR/SPC/SEL

BRIEF BACKGROUND

Global surveillance of antimicrobial resistance (AMR) must build upon nationally representative prevalence estimates obtained following standardized methods for data to be interpretable. Only such data can be used to characterize and track the global scale of AMR, help identify emerging and spreading threats and evaluate the impact of interventions to prevent and/or mitigate AMR. To scale up and optimize global surveillance and ultimately measure progress towards defined targets for reductions in AMR and related morbidity and mortality, a "two-pronged" approach is proposed. This involves continuing to strengthen routine surveillance of AMR in clinical samples from patients with suspected infection and the application of complementary strategies such as periodic nationally representative surveys to measure the prevalence of AMR.

National surveys involve strategic sampling of a population subset. They can provide a reliable, direct measurement of the prevalence of AMR for countries that do not yet have national AMR surveillance systems of high quality and coverage. The World Health Organization has released a new publication that outlines the methodological principles of these surveys, focusing initially on measuring the prevalence of AMR in bacterial bloodstream infections among individuals in need of acute hospital inpatient care. Surveys build upon quality standards, ensuring that the resultant data are comparable within and between countries over time and can inform national policies. Periodic surveys also enhance and expand national technical capacity to transition to strong continuous AMR surveillance systems based on routine analysis of clinical specimens.

POINTS FOR DISCUSSION

Whilst pursuing the goal of <u>universal access to quality diagnostics</u> for microbial identification and antimicrobial susceptibility testing, in the event of clinical infection,

1. A quantitative epidemiological dimension is lacking to evaluate and strengthen national surveillance systems and establish minimum standard thresholds to inform appropriate uses of AMR surveillance data.

At the macro (global)-level, simple, comparable, quantitative metrics are needed which can be used to:

- 'map' national AMR surveillance systems to <u>benchmark standards</u> of quality, population coverage and representativeness <u>required for data use at national and global levels</u> for monitoring and policy development purposes.
- Inform alternative uses of data where benchmark standards for use at global and national levels are not met.
 - Identify settings that could benefit most from intervention, either:
 - o Epidemiological reviews (see below)
 - Nationally representative surveys

At the **micro** (national)-level, an epidemiological review framework is needed which can be used to:

- Monitor and evaluate the national surveillance system in aspects related to quality, population coverage, representativeness and/or sources of bias.
- Develop measures to progressively optimize, strengthen and reduce the bias of the surveillance system given existing capacities whilst ensuring that the system's design is sustainable and coherent with current and projected healthcare needs

- 2. Technical assistance in all aspects of planning, implementation, analysis and reporting is also needed to help scale up and sustain periodic national surveys as a platform for global surveillance of AMR.
- 3. Continuous review of surveillance methods and analytical approaches that can accelerate the availability of reliable data to inform policy is needed.
- 4. Recommendations and tools to transform AMR surveillance data into interventions for its control are needed

KEY QUESTIONS/REQUESTS to CCs

We require statistics and modelling expertise, as well as multi-disciplinary expertise to:

- Help define quantitative benchmark standards to inform appropriate uses of data and allocation of technical resources
- Develop an epidemiological review framework, that considers surveillance needs for different infection syndromes, to support countries in systematic evaluation and strengthening of national surveillance systems
- Support WHO in supporting countries in all aspects of planning, implementation, analysis and reporting of surveys, including the development of training materials, review of country-specific protocols, and development of innovative ideas to optimize all aspects of survey procedures and logistics
- Periodically review approaches and analytical methods used to collect and translate surveillance and survey data into estimates of the prevalence of AMR for global and national monitoring and, in the longer term, to establish and monitor milestones and targets for reductions in the prevalence of AMR

TARGET OUTPUT: Agreeable lists of prioritised deliverables within a defined time frame (i.e., 2023 – 2025)

- Good understanding by the CCs of the objectives of the new phase of AMR surveillance
- Initial mapping of expertise of the CCs in the different areas relevant to the scope of work outlined above
- Initial mapping of capacity among the CCs for country support in the implementation of surveys
- Consensus on preliminary target products for the CC network relevant to the scope of work outlined above

Appendix:

1. Glass manual (new edition); Methodological principles of nationally representative surveys as a platform for global surveillance of antimicrobial resistance in human bloodstream infections

Methodological principles of nationally representative surveys as a platform for global surveillance of antimicrobial resistance in human bloodstream infections

BREAKOUT SESSIONS GROUP IX – Assessment of the Impact of AMR on Mortality

FOCAL POINTS: Sergey Eremin and Olga Tosas Auguet, WHO/HQ/AMR/SPC/SEL

BRIEF BACKGROUND

Recent studies position antimicrobial resistance (AMR) as one of the leading causes of death worldwide, with the highest mortality in low-resource settings. However, morbidity and mortality estimates associated with AMR are difficult to establish and, in many settings, no reliable estimates are available, particularly in low- and middle-income countries. Existing AMR surveillance systems are mostly based on antimicrobial susceptibility testing results for specific clinical specimen types and minimal patient demographics information. The resulting data do not allow for direct assessment and subsequent modelling of the clinically relevant impacts and burden of drug-resistant infections (DRI). These data are of critical importance to estimate syndromic and/or pathogen clinical outcomes, clinical outcomes specifically due to AMR, and the associated costs.

These knowledge gaps emphasize the need for studies on AMR-attributable mortality and morbidity using standardized methods. Application of the GLASS method for estimating attributable mortality of antimicrobial-resistant bloodstream infections (2020) is expected to generate robust estimates of the impact of such infections on global health through a systematic, harmonized approach in all settings. The resultant data are essential to inform policymakers about the potential health and economic advantages of interventions to reduce AMR and establish the resources required to tackle this health concern.

The GLASS protocol to assess attributable mortality due to AMR has been implemented in selected countries and health facilities in Africa and South-East Asia through the Oxford University ACORN ("A Clinically Oriented Antimicrobial Resistance Surveillance Network") network. In addition, the **WHO** Regional Office for the Americas/Pan American Health Organization and the Regional Office for the Eastern Mediterranean are working directly with countries in their regions to begin pilot implementation of the protocol in 2023.

POINTS FOR DISCUSSION

Recognising that attributable mortality studies must build upon improved estimates of the prevalence of AMR in the first place in order to assess the impact of AMR on human health accurately,

- 5. A pathway for AMR-attributable mortality studies is lacking, which sets the route for strategically scaling up these studies to gather interpretable data that can be used nationally and globally. For example, where should these studies be carried out? How much data are required to inform policy? What granularity of data is required? What, if at all, would be the role of modelling? Etc.
- 6. Technical assistance in planning, implementation, analysis and reporting of these studies is also needed as part of the pathway to impact.

KEY QUESTIONS/REQUESTS to CCs

We require statistics and modelling expertise, as well as multi-disciplinary expertise to:

- Help define the pathway for AMR-attributable mortality studies, including a vision of how data may be used to inform concrete interventions and policy at national and global scales.
- Support WHO in assisting countries in all aspects of these studies' such as planning, implementation, analysis and reporting.
- Support WHO in the analysis of data from AMR-attributable mortality studies that have already been completed.
- Periodically review approaches and analytical methods used to collect and translate these data into estimates of AMR's health and economic burden.

TARGET OUTPUT: Agreeable lists of prioritized deliverables within a defined time frame (i.e., 2023 – 2025)

(Every new TP should have a short description to be developed during the breakout session - see annexe).

- Good understanding by the CCs of the objectives of AMR-attributable mortality studies
- Initial mapping of expertise of the CCs in the different areas relevant to the scope of work outlined above
- Initial mapping of capacity among the CCs for country support in the implementation of AMR-attributable mortality studies
- Consensus on preliminary target products for the CC network relevant to the scope of work outlined above

Appendix:

1. GLASS method for estimating attributable mortality of antimicrobial-resistant bloodstream infections

BREAKOUT SESSIONS GROUP VII: Training and dissemination activities

FOCAL POINT: Verica Ivanovska WHO/HQ/AMR/SPC/SEL

BRIEF BACKGROUND

WHO develops global standards and tools and provides technical support to countries for monitoring antimicrobial resistance (AMR) and antimicrobial consumption (AMC). To build national expertise, WHO and the Collaborating Centres (CC) network are developing the WHO Academy (WHOA) course "Antimicrobial resistance and antimicrobial use surveillance: Competencies for policy and practice", aiming to improve capacity-building outreach. The course is an innovative distance-based training that addresses all aspects of AMR and AMC surveillance, develops related competencies and serves policymakers and multidisciplinary professionals involved in surveillance functions at different levels of the health systems.

WHOA course consists of 20 modules covering the important aspects of AMR and AMC surveillance, the resources required to set up and maintain national surveillance systems, and for generation, interpretation and reporting of AMR and AMC data, including their relevance for policy and practice. The final format of the course will range from interactive lectures, practical examples, and exercises to assessments tests, applying the latest adult-learning science and making use of new technologies. The modules are now at different stages of development since the work was started by several WHO staff and eight CCs in 2021. Some modules are close to their final design phase, others are at various stages of script writing, review and feedback. In contrast, a minority of modules still lack assigned script developers and reviewers. More CCs with relevant expertise are needed to support the development and review of modules on AMR surveillance to complete the WHOA course in 2023.

Moreover, given countries needs for training materials, WHOA comprehensive content can be reused and adapted for diverse AMR and AMC training programs across WHO.

POINTS for DISCUSSION

- Consolidation of the WHO Academy course
 - Overview of the course structure and learning objectives (by module)
 - Status of the course development progress (by module)
 - Summary of the production plan, including the identified lags and needs for support (by module)
 - Course completion strategy expected milestones
- Planning of the completion of the WHOA course
 - Match CC's expertise and availability with identified gaps in the course development and envisaged timelines
 - Schedule monthly activities for 2023
- Besides WHOA course, consideration of WHO needs to establish a curriculum with minimum training needs that can be adapted at different levels of WHO

KEY QUESTIONS/REQUESTS to CCs

- Areas of interest/expertise from the CC to support the identified gaps in the course development
- Specific contribution to the course development and review (by module)

TARGET OUTPUT: Agreeable lists of prioritized deliverables within a defined time frame (i.e., 2023 – 2024)

- Good understanding by the CCs of the WHOA course structure, learning objectives and competencies

- Mapping of expertise of the CCs in the identified gaps in the course development
- Agreement and defined plan on specific CC contributions per module and with preliminary timelines

BREAKOUT SESSIONS GROUP VIII - One Health Surveillance Model with Relevance to Human Health

FOCAL POINTS: Sergey Eremin and Arno Muller WHO/HQ/AMR/SPC/SEL

BRIEF BACKGROUND:

AMR is a global threat to animal and human health, food security and safety, economic growth, and the environment. Effective surveillance of antimicrobial use and resistance within and across sectors is an integral part of efforts to monitor the spread and impact of resistance and its main drivers, such as the use of antimicrobials, and to mount an effective One Health response. The Tricycle protocol was developed to provide countries with a common, simple, integrated multisectoral surveillance model. It focuses on detecting a common AMR indicator across sectors, ESBL-producing *Escherichia coli*. The lessons learned from the initial implementation are currently being reviewed. Implementing the tricycle protocol may be a starting/entry point for developing a comprehensive national integrated One Health AMR surveillance system. The Quadripartite organizations (FAO, UNEP, WHO, WHOAH) have established the Quadripartite Technical Group on Integrated Surveillance on antimicrobial resistance and use. They are developing a global platform to make available and share data on AMR and AMU across human, animal and agricultural sectors collected by the respective responsible organizations. The Technical Group will advise the Quadripartite and the Global Leaders Group on Antimicrobial Resistance (AMR) on the needs, scope and form of integrated surveillance to support countries' capacity building on surveillance of antimicrobial use (AMU) and resistance.

Following the review of the lessons learned from the early implementation of the Tricycle protocol, WHO and partners will assess the need to revise the protocol. But countries are already now asking WHO support to implement the Tricycle protocol. Therefore, WHO will seek CC support to further develop the protocol and its implementation. Support is also needed to inform methodological approaches to linking surveillance in humans with other sectors and using these for evidence generation and policy development.

POINTS for DISCUSSION

- Lessons learned from the early implementation of Tricycle protocol
- The need for update and revision of the Tricycle protocol, including:
 - o Addition of new surveillance targets (such as e.g., carbapenemase-producing Enterobacteriaceae explored currently by TRIuMPH, other pathogens and resistance mechanisms)
 - New data collection approaches (e.g. surveys vs continuing passive surveillance in the human sector, expanding targets in the animal sector)
 - o Increasing coverage and representativeness and integration with other surveillance and monitoring initiatives
 - o Involving new types of surveillance sites and target specimens in all sectors, especially in the animal sector
 - More systematic and comprehensive application of whole genome sequencing analysis
 - Developing data sharing strategy
- Potential inclusion of complementary studies to add a One Health dimension to the national prevalence surveys

KEY QUESTIONS/REQUESTS to CCs

- Contribution to peer review of the Tricycle implementation report
- Participation in the review and revision of the Tricycle protocol
- Update the training materials (including videos) and dissemination
- Technical support to the implementation of the Tricycle in countries, including country missions, upon WHO request
- Support in logistics essential supplies/reagents/biological material procurement and shipping

TARGET OUTPUT: Agreeable lists of prioritised deliverables within a defined time frame (i.e., 2023 – 2025)

(Every new TP should have a short description to be developed during the breakout session - see annexe).

Appendix: Reference materials

- 1. WHO integrated global surveillance on ESBL-producing E. coli using a "One Health" approach: implementation and opportunities
- 2. Terms of Reference for the Quadripartite Technical Group on Antimicrobial Resistance and Use Integrated Surveillance (QTG-AIS)

4. Posters of CCs

CUFAR - University Center of Pharmacology [ARG-30]

Institution: National University of La Plata

La Plata, Argentina



Field of expertise of the CC

Expertise in Training, Research and Development related to the Rational Use of Medicines and other health technologies (including Antimicrobials).

- · Strengthening and Training of Pharmacotherapeutic Committees (CFT) for the development of National Lists of Essential Medicines (LNME), National Therapeutic Formularies (FTN) and Clinical Practice Guidelines (GPC).
- · Support countries in the implementation of an integrated approach model for the evaluation, selection, incorporation, prescription, dispensing, use and monitoring of medicines and other health technologies.
- Evaluation of Antimicrobial Consumption at the country level.
- Detection and analysis of Antimicrobial Consumption at the Hospital level
- · Development of tools to build capacity in the learning-teaching process related to medicines, vaccines, diagnosis and other health technologies
- · Provision of authoritative guidance and standards on quality, safety and efficacy of health products

Staff involved / Team members



Perla Mordujovich-Buschiazzo [Director]



[Director] Gustavo H. Marin



 Cristian Dorati [Researcher]



 Lucia Giangreco [Fellow]



 Anahi Alvarez-Rotondo [Fellow]



 Silvina Bruzzone [Support staff]

Ongoing and planned activities related with antimicrobials

- Collaboration with 16 countries of Latin America and the Caribbean in the Registration & Analysis of Local Consumption of Antimicrobials.
- · Support in the implementation of national strategies to control the abuse of antimicrobials belonging to the "Watch" & "Reserve" group.
- · Comparative analysis of the levels of antimicrobial consumption with the degree of bacterial resistance.
- Training for local Health Staff in the identification of sources of information of Antimicrobial Consumption at the country level.
- · Support to Countries, Hospitals to implement PROA, PPS, GLASS tools.
- Support decision-making for national, provincial or local authorities in relation to the selection, use and monitoring of antimicrobials.

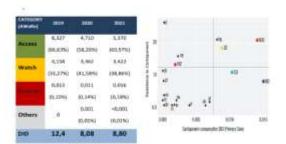
Case study / example of recent work

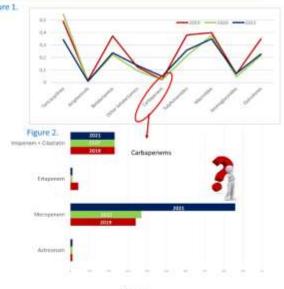
Support at Country level (i.e. Republic of Perú)

Objective:

- Support to the Ministry of the Republic of Peru to detect, analyze and monitor the consumption of antimicrobials at the national level over the last years according to AWaRe classification group.
- 2. Analyze overall DID consumption as well as special situations detected with certain antimicrobial groups (i.e. Carbapenems).
- 3. Analyze correlation of antimicrobial consumption with bacterial

Source of Information: DIGEMID (25.767.537 inhab)





Additional information (to contact us): http://www.med.unip.edu.ar/centros/cufar/ secretaria_cufar@yahoo.com.ar; pmordujo@med.unlp.edu.ar; gmarin@med.unlp.edu.ar

WHO Collaborating Center on Antimicrobial Resistance Surveillance

ANLIS MALBRÁN

Instituto Nacional de Enfermedades Infecci

Instituto Nacional de Enfermedades Infecciosas (INEI)
Administración Nacional de Laboratorios e Institutos de Salud "Dr. Carlos Malbrán" (ANLIS)
Buenos Aires - Argentina



Antimicrobial Resistance

WHOCC ARG-43

Staff involved

☐ Surveillance Networks for Bacterial and Mycotic pathogens

 External Quality Assurance Programs in Bacterilology, Mycololy, and Antimicrobial Resistance for Latinamerican and Caribbean Countries. Responsible Collaborating Center: Viviana Molina



TOR 1 Responsible: Alejandra Corso



TOR 2 Responsible: Cristina Canteros Mariana Mazza Susana Córdoba





TOR 3 Responsible: Carolina Carbonari



TOR 4 Responsible: Patricia Galarza

Activities in support to PAHO/WHO

Activity 1: Provide capacity-building for AMR surveillance data management, analysis and reporting.

Activity 2: Conduct External Quality Assessment programs and provide Reference Centre support for AMR surveillance networks of bacterial pathogens.

Activity 3: Support, at both regional and global level, on strategies to foster AMR surveillance.

Activity 4: Conduct External Quality Assessment and provide Reference Centre support for AMR surveillance networks of mycotic pathogens. Activity 6: Support surveillance of enteric diseases – PulseNet Latin America and the Caribbean.

Activity 7: Conduct External Quality Assessment program and provide Reference Centre support for AMR surveillance networks of N. gonorrhoeae.

Activity 8: Conduct trainings on antimicrobial susceptibility testing for N. gonorrhoeae.

Activity 9: Provide capacity-building for AMR surveillance data management, analysis and reporting trough WHONET software, for ReLAVRA+ and GLASS.

Activity 5: Build capacity for antifungal surveillance of mycotic pathogens.

TP 1 & TP 2 WHOCC ARG-43: Main Activities period 2020-2023

Product	Activities	WWOCC ARG-43	2020	2023	2022	1023
-2227727-7-7-7	Provide or	J.FCA program on AAM is being provided in Latin-American Region (Latin-American ECA program in Bacterialogy and Antimicrobial Resistance, 17 countries)	*		*	*
	Assessment	 EQA program on AMR is being provided in Caribboon Region /Caribbean EQA program in Basterialogy and Annexembled Resistance, 12 countries? 	×	×	×	×
	programme for AAR Conduct	3.ECA program on AAM in Netsserin genorrhoede is being provided in Latin-American Region (Latin- American EGA program in Diagnostic and Antimicrobial Susseptibility of N. genorrhoede, 28 countries)	*	*	×	*
	accessments through our of	4.EQA program on AAM in Netsuria genorrhoece is being provided in Caribbean Region (Caribbean EQA program in Diagnostic and Antimicrobial Susceptibility of N. genorrhoece. 3 countries)		*		*
	or on-site	EQA program on AMRI in Mycology is being provided in Latin-American Region (Latin-American EQA program in Mycology, 11 countries)		*	*	*
	when required	E. PulseNet - Profesiency Test for the molecular surveillance (PFGE) of pathogens associated to faadbarne diseases. (El countries and the Caribbean Region)	*	*	Monthly No William	Artenito turi William
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ryothinus in selected countries	Catenatory Classity Management Systems (CMS) Microgh	2. "Proxing Course on phenotypic methods, screening tests and molecular methods applied to the disposals of AMP" (Notice) and foce to Poce), Barman Airra, Argentina, Coordinated by the World Organization for Animal Health (MHSC/DE) and the Antimicrobial Agents Division, Incitative One Health supported by the European Union. Bo veterination professionals from 34 countries.	professed (Au-CDVID	prorporad due COVID	*	-
	teaching and	8. "Abd Lotin-American measure Course in Antimicrobial Agents" (Size-to face), to Par, Bothia. Coordinated by the "Sociedad Bulkhawa de Microbiología Clinica deta Par" and the Aretimicrobial Agents Division. Humber of gentligants: 1800.	2	===	-	×
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		[30. International Cause "Diagnosis of innovive Jungal disease caused by flumestoss facily". Theoriest— Practical Count. Bureon Aries, Arguetina. Coordinated by Michalogo Department. Theories arihites (234) 70 participents from 16 countries). Practical: 24 h face to foce (selected participants), and 32 h virtual practice.	200	==	-	*
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		17, 16" Reunión Anual de la Red Puisellet América Latina y El Caribe, Brasilla, Brasil, 07-10 noviembre, 2022, Presencial, 18 Latin American Countries and Caribbean Region.	Distinct Marring	Ordina 1	*	10



WHO Collaborating Centre for STI and AMR

WHO COCLARDIATING CENTRE

New South Wales Health Pathology, Microbiology NSW Australia

Field of expertise of the CC

The WHO CC AUS-72 is a part of the largest public pathology provider in Australia

- · Antimicrobial susceptibilty testing
- · Genomic surveillance
- Genomic typing
- · Exploring evolution of pathogen clonality
- · AMR surveillance coordination
- EQAP
- Development and provision of reference panels
- Technical support
- Data Modelling

Team members



Professor Monica Lahra



Professor Sebastiaan Van Hal



Dr Rob George

Ongoing and planned activities

Ongoing activities

- To support WHO's technical work towards further developing and implementing the GLASS including in the WHO CC AMR Network
- To support WHO's technical activities to facilitate its efforts towards coordinating and strengthening the GASP including enhancing GASP (eGASP) in sentinel countries globally.

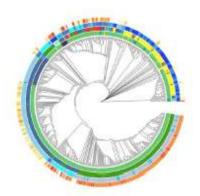
Planned activities

- · Further technical work to strengthen GLASS
- Progress and support GASP/eGASP
- Development of WGS for eGASP
- Delivery of Resource Mapping

Case study: The Enhanced Gonococcal Antimicrobial Surveillance Programme (eGASP).

In 2022, the US CDC with more than 24 partners including the WHO and the WHO CC AUS-72 and SWE-72 launched the United States Global Antimicrobial Resistance Laboratory & Response Network (GARLRN). A GARLRN grant for the WHO and partners WHO CC AUS-72 and SWE-72 to strengthen global and national surveillance systems of N. gonorrhoeae through the eGASP in countries in different WHO regions. Data from eGASP sites will enhance the understanding of how drug-resistant gonorrhoea spreads in geographically diverse areas and inform national and international clinical treatment guidelines.

Ongoing activities to promote the WHO GASP and eGASP among the WPR; SEAR; PAHO and AFR Regions have progressed despite the limitations imposed by the pandemic. AMR data have been reported in 2022. Online laboratory training, technical support and in country training for eGASP protocols have been conducted and site visits are planned for 2023. A wholegenome sequencing component in eGASP has also been initiated and will be optimised in 2023.



Whole genome sequencing of EGASP partner laboratory samples has detected an increase in the number of ceftriaxone resistant sequence types

(submitted manuscript)

Contact

monica.lahra@health.nsw.gov.au

WHO Collaborating Centre for Antimicrobial Resistance

Peter Doherty Institute for Infection and Immunity, Melbourne, Australia

WHOCC-AMR⊚unimelb,eu.au ★ ®WHOCC_AMR

https://www.doherty.edu.au/ who-collaborating-centre-for-antimicrobial-resistance



WHO CC Reference Number: AUS-150

FIELDS OF EXPERTISE



Antimicrobial Stewardship



Pathogen Genomics



Laboratory Diagnosis and Surveillance



Infection Prevention and Control

WHO WE ARE

Designated as a Collaborating Centre in 2021, the Centre is based at the Doherty Institute, University of Melbourne, and brings together a multidisciplinary team of clinicians, microbiologists, pharmacists, infection control consultants, scientists, policy and public health professionals, with capability to support the prevention and surveillance of AMR across clinical settings and public health.





Professor Kirsty Buising

ONGOING AND PLANNED ACTIVITIES

Technical support and guidance

- · Partnerships with Member States to develop and adapt resources, guidance documents and protocols
- · Assistance with drafting policies and procedures, implementation plans, and practical advice and guidance
- · Support situation assessment and context reviews to define technical support required
- · International engagement with Ministries of Health, hospitals, laboratories and other key stakeholders
- · Contribution to global AMR technical guidance as a member of the WHO AMR CC Network.

Capacity building and training

- · Development and implementation of training
- Aligned with country needs and priorities
- Fits within broader policy frameworks
- · "Train the trainer" model to ensure sustainability and knowledge transfer
- · Monitoring and evaluation processes
- · Delivered through a One Health lens
- Building communities of practice across countries/sites
- · Supports advocacy for policy and government support of initiatives

CASE STUDIES



Development of guidance documents for AMR Surveillance and AMR Outbreak Response for the WHO Western Pacific region

The documents aim to support low- and -middle income countries across the Western Pacific region to detect, undertake surveillance, and respond to AMR in major healthcare facilities, and includes practical guidance on infection control, establishing and implementing surveillance systems, and linking up these efforts with laboratory and antimicrobial stewardship programs.

COMBAT-AMR: on-site training at institutions across Member States

COMBAT-AMR is an Australian Government Centre for Health Security funded project that works in partnership with government, National AMR Committees and public health counterparts in Fiji, Samoa, Solomon Islands and Papua New Guinea, to Implement capacity building and training activities to address AMR across infection prevention and control, antimicrobial stewardship, laboratory capacity and surveillance and animal health. As part of this project, on-site training has included ward rounds to support infection control and antimicrobial stewardship, training in the laboratory to enhance diagnostic approaches, and training on AMR data analysis and use, including through the application of WHONET.









Fleming Fund: Mentoring and professional

development to support AMR surveillance The Fleming Fund Fellowships are a UK Government funded initiative to offer a fellowship program for on-the-job training, mentoring and professional development to improve the capability and capacity of key leaders and institutions to respond to the threat of AMR across human and animal health. Fellows are professionals working in relevant areas to address AMR, such as microbiology laboratories, hospitals, Ministries of Health or Agriculture or surveillance teams. Fellows have a training workplan based on their individual and beneficiary institution needs, and undertake a component of their training at the WHO CC training hub. This includes short multi-week placements across our antimicrobial stewardship, laboratory and genomics teams, to learn hands on practical skills around data collection, generation, analysis and reporting for public health and clinical use

Development of WHO Academy online training series
The WHO Collaborating Centre for AMR (AUS-150) is working in
partnership with the WHO Collaborating Centre for AMR,
Consumption and Healthcare-Associated Infections (DEU-144) to support development of AMR modules for the WHO Academy, the WHO's online learning centre to improve health. The Centre is developing an online workshop series to provide learners will skills to implement AMR, AMC and AMU surveillance systems.

WHO Collaborating Centre for Infectious Disease Epidemiology and Control [CHN-120]

Institution: School of Public Health, The University of Hong Kong, Hong Kong Special Administrative Region, China

Field of expertise of the CC

- More than 100 years of history our traditional work was in tobacco control, environmental health, and cancer epidemiology, and we expanded to work on emerging infections after the SARS outbreak in 2003
- Currently 35 full-time faculty, 300 teaching/ research/admin staff, 150 MPH students per year, 100 full-time PhD students
- · Public health advocacy is among our key goals
- We have a strong program on infectious disease epidemiology and modeling (mainly influenza and COVID-19), as well as a strong public health laboratory division (Malik Peiris, Guan Yi, Leo Poon, and others)
- AMR control is one of our key research areas with a number of academic staff working in this area

Staff involved / Team members



 Ben Cowling: infectious disease epidemiology; AMR epidemiology and control



 Wing-Hong Seto: infection control; antibiotic stewardship; diagnostic stewardship



 Peng Wu: AMR surveillance, epidemiology and control; AMR disease burden

Ongoing and planned activities

Ongoing activities

- Supporting WHO's work towards strengthening AMR capacity, including training and surveillance, and contribute to the implementation of the Global Action Plan
- Supporting WHO's AMR surveillance efforts, by conducting data analysis that may inform WHO's work towards the development of the annual Global AMR Surveillance System (GLASS) report
- Providing technical support to WHO in the evaluation of the burden of AMR by provision of technical inputs
- Providing technical input that may inform the development of WHO guidelines and tools on AMR

Planned activities

- Development of methodology for assessment of AMR disease burden
- · Improving guidelines for diagnostic stewardship
- Improving understanding of AMR epidemiology and transmission dynamics, through community-based studies in Hong Kong and the Asia Pacific region
- Improving AMR surveillance locally and regionally

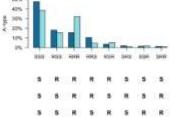
Case study / example of recent work

Existing AMR surveillance is often based on reports from hospital laboratories and public health laboratories, comprising reports of pathogen frequencies and resistance frequencies among each species detected. In this study we discussed an improved framework for AMR surveillance, in which the unit of surveillance is patients with specific conditions, rather than biological samples of a particular type. In this 'case-based' surveillance, denominators as well as numerators will be clearly defined with clinical relevance and more comparable at the local, national and international level. In locations with sufficient resources, individual-based data on patient characteristics and full antibiotic susceptibility profiles would provide high-quality evidence for monitoring resistant pathogens of clinical importance, clinical treatment of infections and public health responses to outbreaks of infections with resistant bacteria.

Ryu et al. 2019 JAC Antimicrob Resist doi:10.1093/jacamr/dlz070



A-type	Skin'roft tissus	Respiratory tract
155	47.0%	36.6%
FRS	10.2%	10,0%
HHM	10.0%	50.2%
RRS	90.5%	4.7%:
RIP	20%	5.2%
385	1.0%	1.0%
888	1.6%	1.8%
SRR	1.3%	0.0%



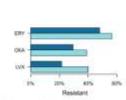


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Space for additional information:

Contact information: bcowling@hku.hk (Ben Cowling) and whiseto@hku.hk (Wing-Hong Seto)

National Reference Center of Bacteriology (NRCB) INCIENSA



Instituto Costarricense de Investigación y Enseñanza en Nutrición y Salud (INCIENSA) Cartago, COSTA RICA

Field of expertise of the CC

The NRCB began its functions in 1991, as coordinator of the National Network of Laboratories for the Diagnosis of Cholera. Subsequently, from 2003, it became the National Reference Laboratory, with four areas of expertise: "Enteropathogens", "Vaccine-preventable and other bacteria", "Antimicrobials", and "Zoonotic febrile Diseases". Since 2021, the NRCB coordinates the development of the national reference laboratory for mycology.

As a Reference Laboratory, the main function of NRCB is the laboratorybased surveillance in all the areas mentioned. Additionally, it also carries out teaching, quality assurance and applied research activities. The NRCB is also involved in logistical support for the investigation of outbreaks and deaths.

The NRCB is the country focal point of the international surveillance networks coordinated by PAHO/WHO in the topics that correspond to it. It supports the compliance of the commitments of the international Health Regulations (IHR-2005).

https://www.inciensa.sa.cr/inciensa/centros_referencia/bacteriologia.asp

Members of NRCB

Grettel Chanto, Microbiologist, MSc (Coordinator of NRCB)

Gletty Oropeza Laboratory technicia Maureen Guzmán Bernal Quirós

Zoonotic febrile Microbiologist Diana Chinchilla, MSo Biotechnologist Stephanie Quirós Diana Chaves

Mycology Microbiologist Mariamalia Cob



Vaccine-preventable and Microbiologist Laboratory technician **Antimicrobials** Microbiologist Antonieta liménez, PhD Tábata Elizondo. Bacteriologist. Natasha Tames, flacteriologist Microbiologist and Bioinformatics Whole Genome Sequencing Ricardo Guttérrez, MSc, PhD

Laboratory technician Priscilla Baltodano Ana Cristina Alonso

Administrative assistance Mariene Montero

Three main activities as CC-WHO at PAHO/WHO's request

- 1-Develop and conduct training for national reference laboratories (NRL) to improve AMR surveillance such as the GLASS.
- 2-Support the Organization in the referential diagnosis of immuno-preventable and food borne diseases and strengthening of laboratory capacity.
- 3-Participate in capacity building activities to improve detection, management, surveillance, and containment of MDR pathogens.

- Identification and AMR mechanisms characterization of different strains (including MDR. Vibrio cholegae and Condida ouris) by request of NRL of Central America (CA) and the Caribbean (CB).
- Trainings on AMR for participants from CA and CB countries, including presentations of the role of laboratories addressing the AMR global threat to public health.
- Participation on the CLSI meetings as part of the WG in charge of updating CLSI: MEZ and ME7, located on the performance Standards for Antimicrobial Disa Susceptibility Tests and dilution AST.
- Providers of reference material and supplies to strengthen surveillance of immuno-preventable, food borne diseases and MDR bacteria in the NRL of CA, the Caribbean and other region by request of PAHO/WHO.

- The NRCB designed, applied, analyzed a survey to determine the technical capacities in the AMR surveillance of factoria and Condido ours in the NRL of CA countries. The NACB delivered a report with these results
- Designed of a proposal for the organization of the PCR area, adapted to the requirements and conditions of the NRI, that requested support
- Designed and organized a workshop for the Laboratory diagnosis of cholera and other enteropathogens, for participants from CA and CB countries.
- Co-organized in different workshops on molecular detection of Streptococcus pneumoniae, Haemophilus influenzae and Heisseria meningitida associated with invasive

Support work for national reference laboratories such as CC WHO

Training activities for NRL

Strengthening of laboratory capacity on AMR

Referential diagnosis of immuno-preventable and food borne diseases

Shipment of reference material and supplies



Technical report .. (8) n-regative bacteria referred by the PMH/DCFH Medical Labora of Commics to Incisessa of Costa Ricu

rigistion of antimicrotical resistan of two Kicholelia presentative testates referred by the Multi National Public Health Laboratory to Incience of Costa Rica









Laboratory diagnosis to NRL, El Salvador



Support in the detection of emerging AMR in CA and CB countries



Preparation of reference strains for shipment to Caribbean countries

Contact information of CC WHO Ref. No. CDR-11 [AMRO]: Head: Grettel Chanto gchanto@inciensa.sa.cr and Antonieta Jiménez



Antimicrobial Resistance in Foodborne Pathogens and Genomics, DEN-69

Institution: Technical University of Denmark, National Food Institute, Research Group of Global Capacity Building, Kgs. Lyngby, Denmark

Field of expertise of the CC

- Strengthening the ability for and increase the quality of the global monitoring and surveillance of antimicrobial resistance (AMR) and infectious diseases
- Development and implementation of methodologies and guidelines to support building the capacity of AMR and Whole Genome Sequencing
- Provision of scientific and technical assistance to supranational organizations and national reference laboratories globally
- Provision of External Quality Assessment schemes and training activities (microbiological and bioinformatics)

Staff involved / Team members



- Rene S. Hendriksen
 Microbiologist, head of unit/ CC
- Susanne Karlsmose Pedersen QMS expect
- Jette Sejer Kjeldgaard
 Molecular microbiologist



Ongoing and planned activities

Ongoing activities

- Drafting the manuscript of the Tricycle study from Jordan in collaboration with WHO EMRO
- WHO HQ, WHO SEARO, WHO WPRO taking part as stakeholders in the Fleming Fund regional grants SeqAfrica and EQAsia

Planned activities

 In person and virtual training of five CEASAR participants in the EU project EURgenRefLabCap in collaboration with WHO EURO

Case study / example of recent work

Programs, projects and activities facilitated by the WHO CC hosting unit, the Research Group of Global Capacity Building



Space for additional information:

Contact information: Rene S. Hendriksen mhe@food.dtu.dk



WHO Collaborating Centre for Research and Training for Health at the Human-Animal-Environment Interface (DEU-134)

Department of Biometry, Epidemiology and Information Processing University of Veterinary Medicine, Hannover, Germany

Field of expertise of the CC

The WHO Collaborating Center for Research and Training for Health at the Human-Animal-Environment Interface (WHO CC HAEI) dedicates it's expertise to the field of Veterinary Public Health, which is generally defined as the impact of Veterinary Medicine on human Public Health.

- Monitoring, surveillance, databases and its management and harmonisation
- · Field studies and secondary data use
- Antimicrobial usage (AMU) and resistance (AMR, national and international data)
- · Statistical methods in epidemiology
- · Teaching courses and conferences in these areas

Staff involved / Team members



 Lothar Kreienbrock [antimicrobial usage & resistance, epidemiology, statistics]



- Sandra Brogden [antimicrobial usage & resistance, veterinary medicine, microbiology]
- Tristan Winkelmann [medical information manager]
- Sinja Bleischwitz [infection biology, AMR epidemiology]

Ongoing and planned activities

Ongoing activities

- Provide courses for seminars to support implementation of ESBL EC Tricycle project model
- Preparing quartipartite collaboration between researcher from Sub-Saharan Africa and WHO CC HAEI
- Simultaneous data collection of AMR and AMU from poultry in Pakistan to investigate relation between AMU and development of AMR

Planned activities

- Set up a direct linkage between AMR and the three One Health areas by investigating AMR simultaneously as a pilot study to further develop WHO Quadripartite One Health surveillance model
- · Developing harmonised measures
- Monitoring antimicrobial usage in animals in Chile and St. Kitts/Nevis

Case study / example of recent work

Pilot on Molecular Surveillance in Germany (possible feasibility study for a One Health surveillance approach

- AMR data from hospitals, from food production and from animals
 of resistent gram-negative Enterobacteriacea isolates from routinescreenings, outbreak investigations and research studies were
 collected from different partners
- For the hamonisation of secondary data broader categories have to be set and sub-datasets need to be selected
- AMR data management (see figure 1)



Figure 1. Data management in 4 pillars of information using the REDCap system of Vandarbilt University

- For data harmonisation, a browser tool was built for data selection and analysis. After data harmonisation WGS genome information were compared between resistant isolates by cluster analysis (see figure 2)
- Possible pilot project for a One Health approach of antibiotic resistance surveillance

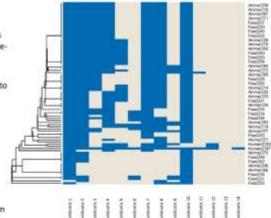


Figure 2: Aggregated WGS data compared between isolates in hierarchical clusters by distance measure to compare dissimilary between isolates from all three One Health areas

Contact information: Lothar.Kreienbrock@tiho-hannover.de; Sandra.Brogden@tiho-hannover

DEU-144: WHO CC for Antimicrobial Resistance, Consumption and Health Care-Associated Infections

Robert Koch Institute (RKI), Berlin, Germany Unit 37 Health Care-associated Infections, Surveillance of Antibiotic Resistance and Consumption

Field of expertise of the CC

The unit at which this CC is located is responsible for obtaining epidemiological data on antibiotic resistance and antibiotic consumption as well as on nosocomial infections and corresponding outbreaks from reports and additional surveillance systems.

Local, regional and national outbreaks of resistant pathogens are investigated by the unit and measures are derived. The unit is involved in the development of case definitions, transmission and evaluation criteria for reportable multi-resistant pathogens, projects and recommendations in the field of antibiotic resistance and nosocomial infections in Germany and internationally. These data are used to formulate, adapt and evaluate prevention strategies and to develop recommendations for diagnostics and patient care.

Ongoing and planned activities

Ongoing / completed activities

- · Supporting WHO in the coordination of the WHO CC AMR Network > Piloting of definitions for Health and work plan revision and implementation
- Germany-Iran Antimicrobial Resistance Research Project (GIARP) workshop in Iran on AMR NAPs and AMR / AMU surveillance data from children in the hospital and ambulatory sector
- Global survey on impact of the COVID-19 pandemic on surveillance, prevention and control of AMR
- Project between the RKI and the Nigeria Centre for Disease Control > Training workshops in Nigeria (NCDC) to improve diagnostic stewardship and the quality of AMR > Development of a training toolkit data in two secondary care facilities in Nigeria and enter of routine diagnostic AMR data in WHONET at national level

- Care-Associated Infections (HAI) in Point Prevalence Surveys
- WHO Academy module development
- > GIARP workshop in Berlin
- WHONET workshops

Planned activities

- on AMR
- > Support of missions on request

Staff involved



Tim Eckmanns Director



Deputy Head of



Arina Zanuzdana CC Network Coordinaton



Anne Harant CC Network Coordination



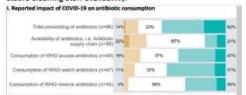
Sara Tomczyk CC Team Lead

Impact of the COVID-19 pandemic on the surveillance, prevention and control of antimicrobial resistance: a global survey (2020)

Background & Methods

The WHO CC AMR Network conducted a survey to assess the effects of COVID-19 on AMR surveillance, prevention and control. GLASS national focal points completed a questionnaire; data were descriptively analysed, income/regional differences were assessed.

Seventy-three countries across income levels participated. During the COVID-19 pandemic, 67% reported limited ability to work with AMR partnerships; decreases in funding were frequently reported by low- and middle-income countries (LMICs: P < 0.01), Reduced availability of nursing, medical and public health staff for AMR was reported by 71%, 69% and 64%, respectively, whereas 67% reported stable cleaning staff availability.



Conclusions

Responses highlight important actions to help ensure that AMR remains a global health priority after the pandemic, including engaging with GLASS to facilitate reliable AMR surveillance data

Published in J Antimicrob Chemother 2021: 76: 3045-3058)

Official Launch of WHO CC for Antimicrobial Resistance, Consumption and Health Care-Associated Infections with panel discussion (2022)



On 18 October 2022 and back-toback with World Health Summit, the Robert Koch Institute (RKI), convened a meeting to launch the new CC DEU-144 for Antimicrobial Resistance, Consumption and Health Care-Associated Infections

and bring together international experts for a panel discussion on the critical global gaps and existing opportunities to leverage for improved AMR prevention and control. Throughout the remarks and discussions, five key themes emerged, including the importance of a:

- 1) multisectoral approach with societal and political engagement;
- 2) patient-centred focus.
- universal health coverage for diagnostics, treatment and infection prevention and control (IPC);
- strengthened antimicrobial stewardship and
- 5) an effective role of national public health institutes and surveillance systems.

There was common acknowledgement among speakers that affordable procurement of diagnostics and antimicrobial therapy and reliable supply chains continues to be a significant challenge in lowand middle-income countries, hindering improved AMR prevention

Published in Eurosurveillance 2022;27(47):pii=2200895.

WHO-Collaborating Center for Reference & Research on Fungi of Medical Importance [IND-99]



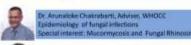
Mycology Division, Department of Medical Microbiology

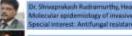
Postgraduate Institute of Medical Education and Research Chandigarh, India

Field of expertise

- Nodal center for active surveillance of in vitro antifungal resistance of fungi isolated from patients.
- Investigation of antifungal resistance mechanism at the molecular level.
- National culture collection for pathogenic fungi, preserves and maintains fungi of medical importance from all over the country and supplies them for teaching and research activities.
- Conducting biannual training courses in diagnostic mycology for faculty and technical staff of microbiology laboratories across the country.
- Providing External Quality Assurance scheme for >150

Team members





Dr. Anup K. Ghosh, Faculty
MALDI-TOF in fungal identification and resistance detection



Ongoing and planned activities

- At WHO's request, research the epidemiology of fungal diseases in SEAR, including but not limited to Pathogens in WHO FPPL, to better understand the burden of these pathogens in SEAR.
- At WHO's request, maintain a culture collection of medically important fungi and supply the strains to researchers in the Member States in the WHO SEAR
- At WHO's request, support WHO in the development and implementation of the WHO Global Antimicrobial Resistance and Surveillance system (GLASS)
- At the request of WHO, provide technical support to member countries in establishing and managing fungal diagnostic services, including training on laboratory techniques, training of the national trainers, on-site visits to assess laboratory surveillance systems as and when required by WHO, and referral testing services to WHO Member States for emerging fungal infections in response to outbreaks.
- Design and provide external quality assessment schemes to AMR national reference labs selected by WHO, in line with GLASS standards on behalf of the WHO

Example of recent work

External Quality Assurance Scheme: The centre is providing the service of EQAS in diagnostic mycology for the last ten years. Every year, two batches of samples are provided to the participants. The participating centres' number and geographical location are represented in Fig 1 and Fig-2, respectively.

Under ICMR, we provide the advanced EQAS for the Advanced Mycology Diagnostic Research Centre Network (MycoNet), aimed at capacity building of mycology laboratories throughout the country. These centres provide complete advanced diagnostic services for fungal diseases and research with a long-term goal of fungal mapping in the country.

National Culture Collection of Pathogenic Fungi: WHO collaborating centre also serves as a National culture collection of Pathogenic fungi (NCCPF). The facility initially sponsored by the ICMR is now an institutional activity.

NCCPF activity includes deposition, maintenance, identification, and supply of all pathogenic fungi.

Currently, it maintains over 2500 strains of fungi, both filamentous and yeasts.

Training Course in Diagnostic Mycology: We have been conducting regular advanced training courses twice a year for the last 14 years to train faculty/scientists and technicians. It has trained >180 faculties and >140 technicians.

With support from WHO, a training course on diagnostic mycology was conducted in Thailand, Myanmar, and Nepal. We recently completed a WHO training course exclusively for Bhutanese participants at our centre.

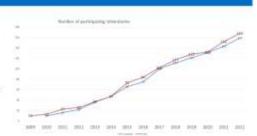


Figure 1: Timeline of number of participating centers in EQAS program



Figure 2 : Geographical location of centers participating in EQAS

Contact Information

Prof. Arunaloke Chakrabarti, (Ex-Professor and Head), Department of Medical Microbiology, PGIMER, Chandigarh (arunaloke@hotmail.com)

Prof. Shivaprakash Rudramurthy (Professor and In-Charge Mycology Division), Department of Medical Microbiology, PGIMER, Chandigarh
(mrshivprakash@yahoo.com)

WHO Collaborating Center on Antimicrobial Resistance



Offices in Bangalore, Kigali, Washington



One Health Trust - Areas of Expertise

- Expertise in economics, epidemiology, disease modeling, clinical and veterinary medicine, geographic information systems, and statistics
- Global leader in antimicrobial resistance (AMR) research
- Experience in country-specific and regional health challenges related to AMR, communicable diseases, vaccines and immunication, health and development, and pandemic preparedness in low-resource settings



JONE WORLD

Progress in addressing AMR in Muli; COVID retected and antivirals

Weekly Digost of the latest news in global health

Team members



Jessica Craig Associate Director, OHT Africa



Oluwatosin Ajayi Research Analyst



Erta Kalamxhi Director, Partnerships



Samantha Serrano Communication Manager

Ongoing

Ongoing activities

. One Health AMR situational analysis in Nigeria, in collaboration with the WHO and the Nigerian Government

Planned activities

- · An AMR snapshot that will contribute to the WHO's global progress report. on combatting AMR.
- · An economic rationale for investing in AMR mitigation strategies

Recent work

Antimicrobial resistance policy information and action brief series

We supported WHO member states to review progress in implementing the national action plan on AMR and identify priorities and key actions to accelerate progress.

General key findings:

- · Advocate for high-level governmental endorsement of the NAP on AMR and increase domestic financing.
- · Increase awareness-raising activities among healthcare workers, financial decision-makers, and the public.
- · Increase AMR surveillance capacity
- · Enhance intersectoral collaboration and data sharing
- · Integrate AMR strategies with other health programs, such as IPC, WASH and Immunization



For questions contact:

Erta Kalanxhi (kalanxhi@onehealthtrust.org), and Jessica Craig (craig@onehealthtrust.org)

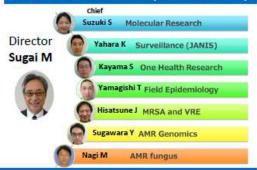
WHO Collaborating Center for AMR Surveillance and Research (JPN-97)

National Institute of Infectious Diseases Antimicrobial Resistance Research Center Tokyo Japan

Fields of expertise of the CC

- Capacity building/technical support: Microbiology laboratory (supporting WHO to implement tricycle surveillance project in selected member states)
- Capacity building/technical support: Surveillance system (supporting data entering, cleaning and reporting on AMR and providing feedback report in selected healthcare facilities through agreed tools including WHONET and ASIARS-Net (Web-based AMR surveillance system based on JANIS (Japan Nosocomial Infection Surveillance)), and conduction of baseline evaluation of laboratory capacity)
- **GLASS Development**
- Understanding the impact of AMR (informing WHO's work towards the development of AMR surveillance and outbreak response guidance papers targeting member states)

NIID AMR-RC Team members (Director and Chief)



Ongoing and planned activities

Ongoing activities

- 1. Endorsement of participation in the trials of ASIARS-Net (1) Prepare an ASIARS-Net site specifically for each country (2) Invite each country to the trial of ASIARS-Net individually
- 2. Technical support of integrated one health surveillance trial (Tricycle project) targeting the extended spectrum beta-lactamase-(ESBL) producing Escherichia coli in Vietnam, Malaysia, and Indonesia
- 3. Communicating with Member states about AMR outbreak response

Planned activities

- 1. Support the development of AMR surveillance through ASIARS-Net for both Member states and WHO GLASS
- 2. Extend collaboration of technical support of Tricycle project
 - Development of guidance on AMR outbreak response

AMR Outbreak Guidance

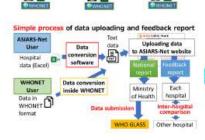
(WPRO)

Three pillars of recent work



Surveillance in humans
Bacterema ESBL* E. col* / E. col*
Bacterema ESBL* E. col* / E. col* Surveillance in the food chain Chicken caecum ES8L* E. coli / E. coli

National level AMR outbreak response in 2021, NIID Support of break respon with a le Surveillance in the environment Bloom and sewage ESB(* E, cot / E, cot





<Contact information>

Director; Prof. Motoyuki Sugai sugai@niid.go.ip

Tricycle project; Dr. Shizuo Kayama kayama@niid.go.jo ASIARS-Net; Dr. Koji yahara k-yahara@niid.go.jo Dr. Yumiko Hosaka hosaka-y@niid.go.jo

Outbreak guidance; Dr. Takuya Yamagishi tack-8@niid.go.ip



[WHO Collaborating Center for prevention, preparedness and response to Antimicrobial Resistance: JPN-98]

AMR Clinical Reference Center, National Center for Global health and Medicine, Tokyo, Japan

About Our Center

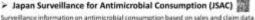
- Our center was established to promote the fight against AMR
- We build and support surveillance systems related to AMR, such as those for infectious diseases and antimicrobial use and conduct epidemiological studies using various types of data.
- Additionally, we provide support in combating antimicrobial resistance and conduct education and awareness-raising activities for the general public and healthcare professionals. -Our systems-



ystem nummarizes the treatment status of infectious diseases at medical institutions nationwide, incidence of health care-associated AMR bacteria, and information on antimicrobial u



and prescribing for upper respiratory infection in clinics



> One Health Platform

Information across sectors is aggregated and visualised from a one health perspective

Field of expertise of the CC

Prevention, preparednessand response to Antimirobial Resistance

- Developing and conducting training and mentoring activities for planning, development, and implementation of antimicrobial stewardship and infection prevention and control activities.
- To provide technical inputs to inform WHO's work toward the development of AMR advocacy and awareness strategies and tools to help champion AMR beyond the health sector.
- To assist WHO's work in the provision of technical assistance to support preparedness for outbreak due to AMR pathogens, including technical assistance for IPC, AMS, diagnostic stewardship, and clinical management.
- To assist WHO's work in the provision of technical assistance to support antimicrobial consumption monitoring.

Team members

- Dr. Norio Ohamagari
- . Dr. Masahiro Ishikane
- Dr. Nobuaki Matsunaga
 Dr. Akane Ono
- Dr. Shinya Tsuzuki
- Dr. Haruhiko Ishioka
- Mr. Ryuji Koizumi

Ongoing and planned activities

Ongoing activities

- Support for WHO's work on strengthening surveillance and research capacity in Member States to tackle AMR, in line with the Action Plan for combating AMR in target countries within WPRO.
- Supporting WHO's work to strengthen testing capacity for AMR pathogens in target countries within WPRO.
- Research for antimicrobial regulations and access in developed and Asian countries.
- Preparation of teaching materials for ASP support in target countries within WPRO (Manual of Antimicrobial Stewardship)

Planned activities

- Provide information to each country and provide/support educational materials to target countries within WPRO based on the Manual of Antimicrobial Stewardship
- Human resource and educational support for the establishment of the Royal Centre for Infectious Diseases in Bhutan.
- Provision of educational materials related to nosocomial infection prevention and control and appropriate antimicrobial use in Bhutan.

Recent work

High-level meetings were held to discuss and promote AMR measures from the perspective of one health in countries in the WPRO area (Tokyo AMR One Health Conference)

An international conference was held to bring together health professionals, researchers, and various stakeholders from Asian countries. Information was shared and workshops were held on practices for AMR control in the human, livestock, and environmental sectors as well as from a cross-sectoral, one-health perspective.



Cooperation, including advice on the establishment and implementation of surveillance systems

Ongoing cooperation, including advice on the establishment and implementation of surveillance systems in the WPRO sector.

Manual of Antimicrobial Stewardship

An English version of the Manual of Antimicrobial Stewardship, a manual developed by the Japanese Ministry of Health, Labour and Welfare (MHLW), has been developed.

This manual may be a useful tool for the promotion of AMR measures in Asian countries, adding some viewpoint of AMR to the usual clinical care of common infectious diseases



Research for antimicrobial regulations and access in developed and Asian countries

The regulatory status of antimicrobials in the countries of the WPRO region was investigated. This is basic information for the study of future AMR control measures in the region.

Contact Information:

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AMR Clinical Reference Center, National Center for Global health and Medicine

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WHO Collaborating Center for AMR Reference and One Health Research



National Institute of Health, Korea Disease Control and Prevention Agency Cheongju-si 28159, REPUBLIC OF KOREA

Institute of Health

KOR-110

Major duties of KOR-110



- · Established in May 2016
- The KOR-110 is in charge of the National Reference Laboratory
- · Multi-sectoral joint project to One Health approach against AMR
- · Surveillance study and research for the mechanism of inter-sectoral AMR spread through a One Health approach



One Health AMR

- . To provide technical support to the labs for AMR surveillance
- To provide technical assistance for EQA programs for WHO GLASS
- . To provide advice for further development of GLASS and One Health AMR surveillance

Staff involved / Team members

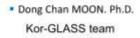
Division of Antimicrobial Resistance Research



 Jung Sik YOO, Ph.D. Director of the division



· Eun-Jeong YOON, R.Ph., Ph.D. One Health AMR team

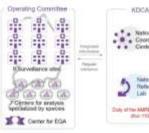




Ongoing and planned activities

Ongoing activities

Kor-GLASS





- EQA support for Mongolian NCCD
- For initiation, a virtual meeting was held between Mongol, KOR-110, and the WPRO regional office
- 1st EQA for NCCD is planned in September



- · Continuing EQA technical support for the WPRO countries
- Involving in the One Health AMR surveillance data analysis
- Involvinng in the One Health AMR protocol curation
- Attempting collaborative research on One Health AMR in the WHO CC network

Recent work

Preliminary study for the One Health AMR surveillance

· An AMR surveillance study of a 3-module design is ongoing in an urban-rural complex city in South Korea through a collaborative project with multiple ministries and external experts.



Networking

· Annual international symposium for One Health AMR





Contact Info

Eun-Jeong YOON ejyoon3@korea.kr

MEX-33 ANTIMICROBIAL RESISTANCE IN FOODBORNE AND ENVIRONMENTAL BACTERIA

Institution: National Service for Agro-alimentary Health, Safety and Quality / General Directorate of Agrifood, Aquaculture and Fisheries Safety, Mexico

Staff involved / Team members



MSc. Leandro David Soriano García General Director of Agro-alimentary, Aquaculture and Fisheries Safety



Chem. Mayrén Cristina Zamora Nava Director of the National Reference Center for Pesticides and Contaminants



Terms of Reference (TOR)

Implementation of WGS protocols and Bioinformatic analysis, as tools for the characterization of AMR Genes and other genomic elements.

Development of a database and a visualization tool for AMR genes data derived from WGS of bacteria isolated from food animals.

Strengthen and build capacity in detection, verification and response to foodborne diseases including AMR.

Field of expertise of the CC



Isolation of foodborne bacteria, such as Salmonella, E. coli, Listeria and Enterococcus from crops and products of animal origin



Whole or second-generation genome sequencing of bacterial isolates



Bioinformatics analysis for subtyping, identification and characterization of AMR genes and phylogenetic analysis

Ongoing and planned activities

Ongoing activities

- Support to Latin American countries for the implementation of WGS protocols, an activity developed as part of the Latin America and Caribbean PulseNet Network.
- Participation as a developer in the WHO course "Surveillance of antimicrobial resistance and antimicrobial use: Competencies for policy and practice".

Planned activities

 Promote on-line technical training on WGS protocols through the socialization of audiovisual material (videos).

Case study / example of recent work

Online course "Antimicrobial resistance: state-of-the-art technological tools for surveillance"

The course consists of 10 videos made with the participation of 7 experts in the field that provide us with an overview of the state-of-the-art technological tools used for surveillance of AMR.

It is aimed at professionals who are involved in the development, implementation or compliance with AMR action plans of Latin American nations, in line with the Global Action Plan.

To broaden the target audience, the course was subtitled in Spanish, English and Portuguese. At the moment, only the Spanish videos are available on the OPS virtual campus platform, and the English subtitled videos will soon be available on this platform. https://www.paho.org/es/eventos/curso-resistencia-antimicrobianos-herrami entas-tecnologicas-vanguardia-para-su-vigilancia



The course is a contribution to the fulfillment of one of the objectives of the Global Action Plan on Antimicrobial Resistance, for which communication, education and training is crucial. This audiovisual material and the activities included will be useful and will contribute to reinforce the central concepts associated with AMR.

Contact information:

leandro.soriano@senasica.gob.mx, mayren.zamora@senasica.gob.mx

Contact information / legal information on e.g. copy right

WHO Collaborating Centre for Antimicrobial Resistance Epidemiology and Surveillance (NET-89)

Centre for Infectious Disease Control, Centre for Infectious Diseases Epidemiology and Surveillance, National Institute for Public Health and the Environment (RIVM), Bilthoven, Netherlands

Fields of expertise

- Knowledge and expertise on AMR surveillance infrastructure
- Data management, standardisation and quality control
- Data analysis and interpretation

Team members

- Danielle Boudville, epidemiologist
- Sjoukje Woudt, epidemiologist
- Jos Monen, data manager
- Wouter van den Reek, data manager
- Susan van den Hof, coordinator
- Carolien Ruesen, coordinator



Ongoing and planned activities

Ongoing activities

- Publication of second joint annual EARS-Net/CAESAR report on AMR surveillance in Europe
- Proof-of-principle antimicrobial resistance routine diagnostics
- surveillance project (PoP project)
- Provision of feedback to CAESAR countries on respective AMR surveillance systems
- Collection and collation of data from CAESAR countries to be used in following joint report
- Data management and reporting for CAESAR and EARS-Net to the GLASS IT platform

Planned activities

- Preparation for publication of third joint annual EARS-Net/CAESAR report on AMR surveillance in Europe
- Country workshops/mission trips: Tajikistan, Georgia, Türkiye, Moldova
- Review and update of CAESAR manual
- Upgrading of scoring system for CAESAR EQA

The CAESAR Network and the First Joint EARS-Net/CAESAR Annual Report on AMR Surveillance in Europe

The Central Asian and European Surveillance of Antimicrobial Resistance (CAESAR) Network

The CAESAR project, a collaboration between RIVM, ESCMID, and WHO Europe, was set up to strengthen national surveillance of AMR in non-EARS-Net countries of Europe by providing technical support in the field of laboratory methods, surveillance methodology and ICT. RIVM provides technical advice on surveillance methodology and technical support within the CAESAR project. The penultimate goal is to set up a network of national surveillance systems so that trends in AMR can be compared across all European countries.

The First Joint EARS-Net/CAESAR Annual Report on AMR Surveillance

In previous years, CAESAR published an annual report on AMR surveillance for CAESAR countries. However, in 2022 the first joint annual EARS-Net/CAESAR report on AMR surveillance in Europe was published. The report was based on AMR data from invasive isolates reported to the CAESAR and EARS-Net networks in 2021 (data from 2020). Twelve countries and Kosovo* reported data to CAESAR, and 29 EU/EEQ countries reported data to EARS-Net.

COVID-19 may have an impact of the numbers of isolates reported, as compared to previous years, fewer E. coli and S. pneumoniae isolates were reported, and typical health-care-associated pathogens were more frequently observed.

Resistance to 3rd-generation cephalosporins and carbapenems was generally higher in K. pneumoniae than E. coli, and high percentages of carbapenem-resistant Acinetobacter spp. were observed. Overall, a north-to-south and west-to-east gradient of resistance was observed.



*All references to Kosovo in this documents should be understood to be in the context of the United Nations Security Council resolution 1244 (1999).





WHO Collaborating Centre for Drug Statistics Methodology [NOR-11]

Institution: Norwegian Institute of Public Health

Oslo, Norway

Field of expertise of the Collaborating Centre

The ATC/DDD system was developed in the early seventies.

In 1982, the WHO Regional Office for Europe established the WHO Collaborating Centre for Drug Statistics Methodology.

Since 1996 a global WHO Collaborating Centre to the World Health Organisation in Geneva.

The tasks on national and international AMC/AMR are performed in close collaboration with the department for Antibiotic Resistance and Infection Prevention at NIPH. Staff of the Centre is responsible for all national drug consumption statistics in Norway and are appointed national coordinators to ESAC-net, ECDC and GLASS.

Staff involved in AMR-work



· Hege Salvesen Blix; antibiotic stewardship, surveillance of antibiotic use, pharmacoepidemiology, training, support and supervision for the application of the ATC/DOD methodology in surveillance and research

Irene Litleskare: surveillance of antibiotic use in



 Live Storehagen Dansie: surveillance of antibiotic use humans and animals, pharmacoepidemiology,

humans and animals, pharmacoepidemiology, training, support and supervision for the application of the

ATC/DDD methodology in surveillance and research



Ongoing and planned activities

Ongoing activities

- · To classify drugs according to the ATC system
- To establish defined daily doses (DDDs)
- To stimulate and influence the practical use of the ATC/DDD
- To support WHO's global activities on AMC in GLASS
- To support WHO in developing WHO Academy for AMR/AMC surveillance
- To support WHO Europe on AMC in the European network for AMC
- To support ECDC on the ESAC-net activities
- To perform national drug utilization statistics

Planned activities

- · Improving the understanding of using the ATC/DDD methodology in drug utilisation research
- Develop quality indicators for appropriate antimicrobial use
- Use AMC prescribing data in feedback reports in continous education programs for prescribers

Case study / example of recent work

In order to give useful and practical advice in the use of the ATC/DDD methodology for drug utilisation purposes we take active part in the national AMC surveillance.

- The use of antimicrobials have been monitored in Norway since the seventies -- both in humans and in animals
- The ATC codes and ATC vet codes are linked, enabling us to see the AMC data in a holistic perspective
- The Norwegian annual publication NORM-NORMvet includes data on AMR and AMC in humans and animals
- Comparisons of patterns of use in both settings are important in a one-health persepective
- Data on trends in prescriptions and dosages are performed
- separately in the two settings; in weight for animals and in DDD/1000 inhabitants/day for humans
- This annual report has been available since 2000 and has been essential in antibiotic stewardship programs in Norway, for setting policies, assessing risks and evaluating interventions. Data also serves as the basis for specific research projects

TREE ..

Figure. Use of antibacterials in a) humans, ATC group J01 and b) food producing animals ATC group QJ01 and QJ51.



Contact information hoge salvesen blix@fhi.no and whocc@fhi.no

WHO Collaborating Centre for Capacity Building on Antimicrobial Resistance Surveillance and Research (RUS-126)

Institution: Smolensk State Medical University, Smolensk, Russian Federation

Field of expertise of the CC

- Officially designated national reference laboratory for AST and AMR surveillance in Russia.
- Central laboratory for sentinel surveillance of AMR in nosocomial and community-acquired infections.
- Russian NAC lead laboratory for development, harmonization and implementation of AST recommendations.
- Informatics and cloud solutions for AMR surveillance and antimicrobial stewardship.
- Genomic surveillance of priority nosocomial pathogens and major AMR determinants.

Staff involved / Team members



- Roman Kozlov (the Head of the Collaborating Centre)
- Mikhail Edelstein
 (use of molecular methods to foster surveillance implementation; use of WGS for AMR surveillance)
- Marina Sukhorukova (capacity building/ technical support)

Ongoing and planned activities

Ongoing activities

- National coordination of CAESAR/GLASS.
- EQA provision for Russian laboratories.
- Supporting WHO in capacity building activities in CAESAR network countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan).
- Translation and adaptation of WHO and EUCAST manuals and guidelines.
- Development of IT solutions to strengthen AMR surveillance and antimicrobial stewardship.

Planned activities

- Strengthening Russian national surveillance program in alignment with CAESAR and GLASS through capacity building activities and capacity assessments.
- Laboratory training by Russian-speaking trainers for the implementation of CAESAR and GLASS as well as for the implementation of EUCAST methodology/standards and GLP in Russian speaking Countries through educational workshops, webinars and on-site visits.
- Expansion and strengthening of the ongoing activities.

Case study / example of recent work

Activities beyond CAESAR and GLASS

AMR educational workshops, trainings, and webinars (47 events in 2022 with the total audience of more than 8,000 participants/trainees)









Ecosystem of web products, dedicated to AMR



AMProsp net - a web platform for analysis of AMP data in Russia that contains a set of tools to visualize the data on distribution of antimicrobial suppossibilities and main genetic resistance determinants in direct improbal isolates.



AMProjosat, ner – a veb platform for energies and sharing of AMR surveilland data. Where excounts in 2022: = 1,150 Uner-generated projects: > 000











Phenotypic and molecular AMR surveillance in Russia and neighbor countries





Contact information:

46a Kirova street, Smolensk, 214019, Russie E-mell: <u>Burner, Korova Questientic na</u>

SAA-23: WHO Collaborating Centre for Infection Prevention and Control and Anti-Microbial Resistance



Infection Prevention and Control Department, King Abdulaziz Medical City Hospital (KAMC)
Riyadh, Saudi Arabia

Field of expertise of the CC

KAMC WHO CC for IPC and AMR is a leading center in the WHO/EMRO region in the following activities;

- Building capacity of infection control professionals, by conducting several educational and training activities
- Building capacity of antimicrobial surveillance and stewardship, through training, documents, and publications
- Improving infection control surveillance, by creating a regional manual and conducting multipe training activities
- Providing consultations to WHO/EMRO office and other hospitals in the region
- Assisting WHO/EMRO office in development of technical documents such as guidelines and manuals
- · Publishing high rank scientific publications

Staff involved / Team members











- Dr Majid Alshamrani
- Head of IPC department at KAMC, Riyadh, Saudi Arabi
- Dr Mohammed AlZunitan
 Hospital Epidemiologit at KAMC, Riyaah, Saudi Arabia
- Dr Aiman El-Saed Ramadan
- Dr Asim Alsaedi
- Head of IPC department at KAMC, Jeddah, Saudi Arabia
- Dr Fayssal Farahat
- Public Health Consultant at KAMC, Riyadh, Saudi Arabia

Ongoing and planned activities

Ongoing activities of KAMC WHO CC for IPC and AMR

- Collaboration with WHO/EMRO to organize multiple webinars that support the awareness of IPC core components and IPC recommendations in special situations Collaboration with WHO/EMRO to increase AMR surveillance and stewardship capacity through supporting the development of technical documents and reports as well as education and training
- Collaboration with WHO/EMRO in promoting international research projects in IPC and AMR

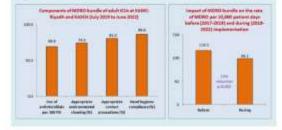
Planned activities of KAMC WHO CC for IPC and AMR

- To conduct a large multihospital study in GCC and EMRO region to assess point-prevalence of HAIs and AMR in the region
- · To update the regional infection control and surveillance manuals
- To resume visits to countries in need to conduct face to face
- training as well as assessing IPC set up and services
 To prepare scientific publications assessing surveillance quality and IPC staff competency in the EMRO region

Case study-1: Novel MDRO Bundle

Implementation and Impact of a novel Preventive Bundle for MDROs in Intensive Care Setting

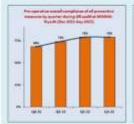
IPC department at KAMC-R developed a novel four-component preventive bundle against multidrug-resistant organisms (MDRO) in intensive care units (ICUs). It included overall use of antimicrobials, appropriate environmental cleaning, appropriate contact precautions, and hand hygiene compliance. The implementation of the MDRO bundle was associated with modest decrease in MDRO rates (-16%) in adult ICUs. We are looking for expansion of the bundle implementation at a larger scale in the hospitals of the region.

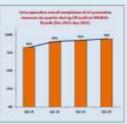


Case study-2: SSI Improvement Project

Surgical site infection improvement project at MNGHA hospitals in Saudi Arabia

The improvement project aimed to identify breaches in SSI prevention followed by corrective actions to decrease SSI rates. An epidemiological investigation has been launched in Oft theater in Q4 2021 focusing on many pre- and intra-operative practices. The findings have been followed by a comprehensive education/auditing during 2022 to ensure regaining standards and quality of care. The interventions were followed by 11% and 12% improvements in compliance with pre- and intra-operative practices, respectively.





For additional information: Please contact Dr Majid Alshamrani through email: Dr_shomrani@yahoo.com

WHO Collaborating Centre for Antimicrobial Resistance [SOA-43]

National Institute for Communicable Diseases (NICD) a division of NHLS, Centre for Healthcare-Associated Infections, Antimicrobial Resistance and Mycoses (CHARM) Johannesburg, South Africa EQUAFFICA





Field of expertise of the CC

The NICD is a national public health institute of South Africa, providing reference microbiology, virology, epidemiology, surveillance and public health research to support the government's response to communicable disease

The NICD serves as a resource of knowledge and expertise of communicable diseases to the South African Government, Southern African Development Community countries and the African continent. The institution assists in the planning of policies and programmes to support and respond to communicable diseases and provides national reference laboratory and surveillance services which comply with applicable ISO requirements; all reference laboratories are SANAS accredited. Senior NICD faculty are affiliated to universities and are involved in mentoring postgraduate students. The institution is a WHO Collaborating Centre for AMR and polio and has provided the WHO Afro region with a regional microbiology external quality assessment programme (EQAP) for national public health labs, targeting priority epidemic prone diseases and laboratory identification and AST of causative agents of diarrheal diseases. meningitis, sepsis, pneumonia, plague and others.

Staff involved / Team members

All staff members involved









Olga Perovic CC head and Nelesh Govender CC deputy head

Ongoing and planned activities

Ongoing activities

- 1. To support WHO's activities on strengthening antimicrobial resistance (AMR) detection and surveillance through training on antimicrobials and diagnosis.
- 2. To support WHO efforts to enhance country laboratory capacity to perform AMR surveillance through technical assistance.
- 3. To support AMR surveillance at regional and global levels through providing strategic advice to WHO and technical advice for enhancing laboratory capacity to perform surveillance for priority bacterial pathogens.

Planned activities

- 2023 EQA program for basic bacteriology, detection of epidemicprone bacterial diseases and antibacterial susceptibility testing (AST).
- EQuAfrica program planned for second phase.
- Training and mentorship program for Fleming Funded countries and EOA providers
- Development of PGI roadmap in African continent
- AMR surveillance for E. coli, 6 months April-September, 2023.

There are two tiers for AMR surveillance at NICD: 1.e-surveillance at the NICD dashboard which compiles AMR data from public and private sectors from routine laboratories, depending on reporting from microbiology laboratories and on appropriate standardization processes. 2. GERMS-laboratory based surveillance from sentinel sites on ESKAPE isolates from blood culture. It collects isolates and integrated health data via a CRF based on design of surveillance, which collects data such as demographics, treatment management, antibiotic administration, underlying diseases, diagnosis, clinical outcomes, microbiology and molecular epidemiology. This data may help to distinguish between community- and healthcare-associated infections.

Case study/example of recent work that feeds to E. coli surveillance: Antimicrobial resistance prevalence and transmission between animal feed and humans, 2020 and NICD DB to feed GERMS

The aim of the study was to determine the prevalence of AMR, measure the association between antimicrobial usage and the emergence of AMR, as well as determine the risk of transmission of AMR genes between the farm environment, farm employees and animals in commercial pig farms in South Africa. A single farm was successfully enrolled after the completion of informed co Located in North-West province, in-operation since 1954 and employees 75 workers full-time. Consist of two production sites, with 25 production houses, managed by the same farmer, sow population = 1 415.

A total of five fresh, undisturbed pig faecal droppings were collected aseptically (Minimum weight = 10 g) from randomly selected pens per production house.

Results in figures below - isolates from pig faecal droppings, and AST of E. coli from humans and pigs.

Planned activities: AMR surveillance for E. coli in sterile site isolates

To set a scene for future "One Health" surveillance

To describe the epidemiology of laboratory confirmed, invasive disease in hospitalized patients.

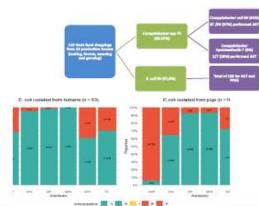
Comparison of hospital versus community acquired infections

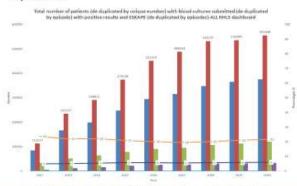
Detect and confirm the molecular resistance genes of select E. coli isolates and

investigate the pathogenicity of invasive E. coli strains. Monitor for emerging resistance in E. coli .

Investigate risk factors for E. coli acquisition.

Figure below displays percentage of ESKAPE pathogens over the period of 8 years and explains trends.





Space for additional information: Olga Perovic, A/Prof Olga Perovic, Principal Pathologist, Centre for Healthcare-Associated Infections, Antimicrobial Resistance and Mycoses (CHARM): Associate Professor, University of Witwatersrand; Head, WHO Collaborating Centre for AMR; olgan@nicd.;

WHO CC for AMR Containment



Public Health Agency of Sweden, Department of Communicable Disease Control and Health Protection, Solna, Sweden [SWE-66]

Field of expertise of the CC

The WHO CC draws from the interprofessional competence located at PHAS within the area of AMR, including:

- Surveillance of AMR/AMC at international, national and local levels
- Clinical microbiology
- · Infection prevention & control
- · Antimicrobial stewardship
- · Intersectoral coordination (One Health)
- · Behavioural & cultural insights

Staff involved / Team members

- Sonja Löfmark. Director WHOCC
- Jonas Fuks. International cooperations, surveillance, national ICM.
- Andreas Sandgren. Head of Unit for Antibiotics and Infection Control
- Emily Sellström, Wenjing Tao, Sofia Ny, Anette Hulth, Ragda Obeid, Olov Aspevall, Srebrenka Dobric

Ongoing and planned activities

Ongoing activities - support to

- WHO Academy: Surveillance competencies for policy and practice
- Azerbajdjzan IPC and AMR national programme
- GLASS 2.0
- · Mozambique AMR/IPC hospital pilot

Planned activities

- Baltohop
- Support to countries in implementation of AMR and IPC strategies, plans and activities



Case study / example of recent work:Latvia One Health, One Plan

A Latvian-Swedish bilateral collaboration for sustainable implementation of a One Health National Action Plan to combat antimicrobial resistance 2019-2022

A successful cooperation

Swedish and Latvian partners worked closely together to adapt the content to Latvian context to ensure capacity development and sustainability. Swedish experts shared their knowledge and experiences with Latvian clinicians, veterinarians and farmers as well as stakeholders at the national and ministerial levels.

All aims of the project were met, and introduced methods have already been applied.

Three overarching outcomes, created to meet the needs identified in an internal analysis of the AMR situation in Latvia.

- Empower implementation of the One Health National Action
- Provide skills and tools for prudent use
- Establish an intersectoral coordinating mechanism

Project partners: Latvia; Ministry of Agriculture, Ministry of Health, Centre for Disease Prevention and Control. Sweden; Public Health Agency of Sweden, Swedish Board of Agriculture, National Veterinary Institute

Results

- · An updated One Health NAP with prioritized activities
- A sustainability plan for further strengthening of inter-sectoral collaboration and continued implementation
- · A toolbox for antibiotic stewardship in farm animals
- A toolbox for antibiotic stewardship and antibiotic ward rounds in hospitals, including online training
- Training of Latvian professionals to implement the toolboxes
- Establishment of an Intersectoral Coordinating Mechanism
- A roadmap to ensure increased intersectoral work and communication on AMR in Latvia

Future

In 2023, a 2-year project based on the concepts of LATOHOP will be initiated. It will involve Denmark, Estonia, Latvia, Lithuania, Norway and Sweden and is financed by Nordic Council of Ministers through NordForsk.

Funding

Funded by the European Commission through the Directorate-General for Structural Reform Support (DG REFORM), Technical Support Instrument.



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https://www.folkhalsomyndigheten.se

SWE-72

Örebro University Hospital, Department of Laboratory Medicine Örebro, Sweden

Field of expertise of WHO CC

Obligations to WHO, Geneva, Switzerland

- Support WHO with expertise in its work against sexually transmitted infections (STIs), by assisting in laboratory issues, guidelines and frontline research (STI diagnostics, treatment, AMR and genomics)
- Monitor AMR in N. gonorrhoeae and treatment of gonorrhoea, and provide WHO with advices and front-line research in this field
- Enhance the surveillance of AMR in the WHO Global Gonococcal Antimicrobial Surveillance Programme (GASP) and WHO Enhanced GASP (EGASP)
- Maintain an up-to-date WHO reference panel of N. gonorrhoeae for quality assurance of diagnostics, including AMR testing, and genomics globally
- Support the WHO programme for development and laboratory validation of novel rapid point-of-care (POC) tests

Key WHO CC Staff

- Magnus Unemo, Director
- Daniel Golparian, Scientific Officer
- Susanne Jacobsson, Scientific Officer

Ongoing and planned activities

- Expanding WHO GASP/GLASS (~70-75 involved countries per year) and currently analysing and writing up 2019-2020 results.
- Expanding WHO EGASP in Thailand (evaluated and included since 2015), Uganda and South Africa (2022), Malawi and Vietnam (2023).
 2-3 additional countries per year will be included.
- Leading Euro-GASP, ECDC (25 EU/EEA countries) together with UKHSA, London, United Kingdom.
- Evaluating Xpert CT/NG and TV assays in the global WHO ProSPeRo study.
- Finalising the WHO global manual for Laboratory and Point-of-Care Diagnostic Testing of STIs/HIV (launch July, 2023).
- Relevant research: N. gonorrhoeae diagnostics, treatment, AMR and genomics (basic science, AMR, and genomic epidemiology).
- Special current focuses: i) N. gonorrhoeae AMR surveillance (phenotypic and molecular), ii) international genome-based epidemiology, and iii) identification and evaluation of novel antimicrobials for gonorrhoea treatment.
- Novel treatments and their pharmacokinetics/pharmacodynamics evaluated in our hollow fibre infection model (simulate real gonococcal infections) include the novel antimicrobials zoliflodacin (mono- and combination thearpy) and lefamulin, and currently used antimicrobials (ceftriaxone, azithromycin, doxycycline, ciprofloxacin).

Relevant recent references

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- Wi T et al. Antimicrobial resistance in Neisseria gonorrhoeae: global surveillance and a call for international collaborative action. PLoS Med 2017;14(7):e1002344.
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- Day MJ et al. Significant increase in azithromycin "resistance" and susceptibility to ceftriaxone and cefixime in Neisseria gonorrhoeae isolates in 26 European countries, 2019. BMC Infect Dis. 2022;22(1):524.
- Golparian D et al. GyrB in silico mining in 27151 global gonococcal genomes from 1928-2021 combined with zoliflodacin in vitro testing of 71 international gonococcal isolates with different GyrB, ParC and ParE substitutions confirms high susceptibility. J Antimicrob Chemother. 2022:dkac366.
- Jacobsson S et al. Pharmacodynamic Evaluation of Zoliflodacin Treatment of Neisseria gonorrhoeae Strains With Amino Acid Substitutions in the Zoliflodacin Target GyrB Using a Dynamic Hollow Fiber Infection Model. Front Pharmacol. 2022;13:874176.
- Jacobsson S et al. Pharmacodynamic evaluation of lefamulin in the treatment of gonorrhea using a hollow fiber infection model simulating Neisseria gonorrhoeae infections. Front Pharmacol. 2022;13:1035841.

Contact information: Magnus Unemo (magnus.unemo@regionorebrolan.se)

SWE-74

WHO Collaborating Centre for Standardization of Antimicrobial Susceptibility Testing of Bacteria*



Department of Clinical Microbiology, Central Hospital Växjö, Sweden

Field of expertise of the WHO CC

- Swedish national reference laboratory for phenotypic antimicrobial susceptibility testing (AST)
- The EUCAST Development Laboratory (EDL) is hosted within the Department of Clinical Microbiology which is the expert laboratory for EUCAST in developing and validating methods in AST of bacteria
- EDL provides background material for defining of clinical breakpoints and epidemiological cut-offs (ECOFFs) for EUCAST and European Medicines Agency (EMA), as well as providing technical support to clinical microbiology laboratories
- Development and implementation of training sessions in AST, both in real life and in the form of webinars, online courses and training videos.

Staff involved / Team members



Dr Oskar Ekelund Head Dept. of Clinical Microbiology



Dr Onur Karatuna Clinical Microbiologist EUCAST Development Laboratory



Åsa Johansson Deputy Head Dept. of Clinical Microbiology



Jenny Åhman Analyst EUCAST Development Laboratory



Prof Gunnar Kahlmeter Head EUCAST Development Laboratory



Emma Jonasson Biomedical Analyst EUCAST Development Laboratory



Dr Erika Matuschek Lead Scientist/Operational Manager EUCAST Development Laboratory

Ongoing and planned activities

Ongoing activities

- Preparing background material for EUCAST Steering Committee work
- · Breakpoint and breakpoint table development
- Preparing for new agents and for new species
- Development and upkeep of QC criteria (yearly update of the QC table)
- Organising multi-national efforts to permit new methods and breakpoints for difficult bacteria such as recent work with Burkholderia pseudomallei, Vibrio cholerae and four more Vibrio species, Corynebacterium diphtheriae and C. ulcerans, currently ongoing breakpoints and methods for Brucella melitensis and Bacillus anthracis.
- Development of rapid AST (RAST) from blood culture bottles
- Issuing warnings regarding AST methodology on www.eucast.org
- · Troubleshooting AST methodology
- Welcoming international observers/trainees for training on site
- Participation in international and national training workshops
- Dissemination of good laboratory practice in the field of AST, education, and training

Planned activities

- Development of a strategic roadmap for implementation of EUCAST standard in the laboratory network
- Roll-out of technical guidance related to AST procedures in line with current EUCAST recommendations
- Organizing educational activities for EUCAST standard implementation in form of webinars and face-to-face trainings
- Dissemination of relevant EUCAST documents via a dedicated website
- Publication of a newsletter (4 issues per year) to disseminate latest developments in EUCAST methodology
- Development of guidance documents for EUCAST implementation
- Provision of training and guidance for the laboratories on practical aspects of AST with EUCAST methodology, development of standard operating procedures and technical support for troubleshooting
- Observerships (each visit 1 5 days) for a maximum of 4 persons per year

* This information could be preliminary because the designation process is being finalized.

Contact information: Dr Oskar Ekelund (oskar.ekelund@kronoberg.se) and Dr Onur Karatuna (onur.karatuna@kronoberg.se)





WHO Collaborating Centre for Patient Safety and Antimicrobial Resistance [SWI-82]

Institution: Geneva University Hospitals and Faculty of Medicine, Geneva, Switzerland

Field of expertise of the CC

Since the early 90ies, the WHO has worked with the Geneva University Hospitals to develop and promote a strategy for improved hand hygiene implementation, including active involvement in the annual Global Hand Hygiene Day (May 5th). Since its inception in 2005, we have contributed to the strategic agenda of GLASS, and affiliated projects. As the infection control program at a large university hospital, we run many different projects at national and international level. Nationally, we focus on semi-automated surveillance of hospital-acquired infections, point prevalence surveys, implementation of antimicrobial stewardship including clinical decision support systems, and improvement of surgical prophylaxis. At international level, we participate in projects like COMBACTE and ECRAID, developing methods for more efficient clinical trials, PRIMAVERA, looking at the possible impact of vaccines/monoclonal antibodies on the burden of AMR and REVERSE, evaluating efficiency of different IPC measures.

Staff involved / Team members



 Didier Pittet: hospital epidemiology; infection prevention, hand hygiene



 Stephan Harbarth: infectious diseases, hospital epidemiology; infection prevention, antibiotic stewardship



 Marlieke de Kraker: AMR surveillance, AMR epidemiology;
 AMR disease burden

Ongoing and planned activities

Ongoing activities

- Identify and contribute to topics/sections of the WHO Guidelines on Hand Hygiene in Health Care that require evidence update
- To provide technical expertise for the assessment of the attributable mortality of AMR bloodstream infections (BSI) in different settings
- To provide technical expertise for syndromic empiric antibiotic treatment recommendations included in the Model List of Essential Medicines, and for AWaRe Classification of Antibiotics
- To provide advice to WHO on research and development (R&D) prioritization for new antibacterial treatments

Planned activities

- Involvement in the implementation of the master protocol for estimating attributable mortality of AMR bloodstream infections in diverse settings
- Further development and implementation of KAP surveys to provide more insights in culturing practices in hospitals in lowincome settings
- Assessment of the impact of novel treatment strategies, like vaccines, on the burden of AMR
- Developing novel strategies for AMR surveillance in the hospital setting to detect patients with MDRO colonization

Case study / example of recent work

Implementation of hand hygiene in health-care facilities: Results from the WHO Hand Hygiene Self-Assessment Framework global survey 2019

From Jan to Dec 2019, IPC professionals were invited globally to complete the online Hand Hygiene Self-Assessment Framework (HHSAF).

3206 unique responses from 90 countries (46% WHO Member States) showed that most health-care facilities had an intermediate level of hand hygiene implementation or higher, for which health-care facility funding and country income level were important drivers.

Availability of resources, leadership, and organisational support are key elements to further improve quality of care and provide access to safe care for all.

De Kraker et al. Lancet Infectious Diseases Table 2 Winglind words for the flow elements of the Haad Higgine Self-Attenuent Frances (INSAF) survey 2015, overall and statisfied 2022: 22: 835-844

	System Change	Training and Education	Evaluation and Feedback	Reminders in the Womplice.	Institutional Safety Climate	Total score:
Overall	3165, 85 (55-100)	381,75(16.90)	3137, 70 (41-85)	3153:71/(50-95)	31411, 55 (35-75)	3041, 350 (2.41-430)
Region						
Africa	543:20 (35:50)	644.61(35-85)	60x 55(20-B0)	640,60 (42-90)	617, 55 (30-65)	626, 252 (161-184)
Equitoro Mediteronous	541,99(95,400)	536,89 (60-90)	534-75 (55-115)	\$34,90 (70-506)	531,65 (80.00)	23/388/3/0-4ee
Bance	543, 100 (R)-100)	647,75 (68-90)	643 70(50-85)	646;70 (\$8-85)	647; 55 (40-71)	(85.35) (805-413)
Arrentas	534:75 (90-300)	511:70 (45:90)	504 70(50-85)	507:63148-833	902, 95 (90-80)	458; 330 (245-623)
South East Avin	32, B0 (45-85)	71:63 (25:70)	75, 60 (30-85)	71:63 (22-87)	20, 30 (10-75)	20, 225 (157-411)
Western Facility	701; 100 (55-100)	757 (85 (55-100)	740, 80 (55-95)	755 (44) (16-90)	735; 55 (90-8in)	694,350 (303-447)
more led						
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Space for additional information:

Space for additional information.

Contact information: stephan.harbarth@hcuge.ch (Stephan Harbarth) and marilieke.dekraker@hcuge.ch (Marilieke de Kraker)

THA-71

WHO Collaborating Center for Antimicrobial Resistance Surveillance and Training



National Institute of Health, Department of Medical Sciences, Ministry of Public Health, Nonthaburi, Thailand

Field of expertise of the CC

- · Strengthening surveillance network
 - Laboratory training/workshop on AMR surveillance for microbiologists to strengthen quality assurance programmes of laboratories
 - External Quality Assurrance (EQA) programme for AMR
 - · WHONET training for AMR surveillance
 - AMR data management and analysis for antibiogram and AMR trend at hospital, health regional and national level

Staff involved / Team members



Dr. Watcharaporn Kamjumphol AMR surveillance and PT Provider



Mr. Aekkawat Unhalekhaka [Laboratory and WHONET training]



Dr. Kulsumpun Krobanun [Laboratory]



Ms. Phimrata Leethongdee [WHONET training]

Ongoing and planned activities

- Activity 1: Provide support to the national body in charge of national AMR surveillance in data collection, data management and report to enable the submission by the Member States of valid and reliable data to GLASS.
- Activity 2: Support WHO in the development and implementation of GLASS through the periodic revision and continuous development of the GLASS system and manual as well as development of additional supporting documents.
- Activity 3: Perform microbiology laboratory capacity activities, including conducting trainings on laboratory techniques and on-site visits to assess laboratory surveillance systems.
- Activity 4: Design and provide external quality assessment schemes to AMR national reference labs selected by WHO, in line with GLASS standards.
- Activity 5: Support the efforts of WHO to develop a Global AMR Laboratory Network aligned with regional initiatives to strengthen laboratory networks, including mapping existing capacity for the detection of AMR priority pathogens in NRL in SEAR Member States.

Case study / example of recent work

National Institute of Health, Department of Medical Sciences, Ministry of Public Health, Thailand, desinated as WHO Collaborating Center for Antimicrobial Resistance Surveillance and Training Center is responsible for National Reference Laboratories for AMR in Thailand.

Proficiency testing (PT) Provider for AMR

Since 2016, Our CC have provided external quality assessment (EQA) scheme to Member States laboratories.

Number of participating laboratories were continuely increased during 2016 to 2019. In 2018, our participating laboratories were expanded (included along with) to WAPRO. However, the EQA participants were dramatically reduced in 2020 due to COVID-19 pandemic (Figure 1.).

Our institute has accreditation as PT provider on bacterial identification and antimicrobial susceptible testing programme in 2021. These assessments are part of laboratory and proficiency testing provider accreditation process complying to ISO/IEC 17043:2010.

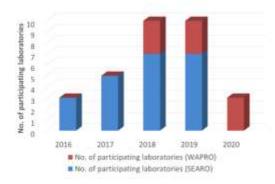


Figure 1. The participating laboratories on EQA programe on bacterial identification and antimicrobial susceptible testing

Contact us

EQA programe on bacterial identification and antimicrobial susceptible testing, <u>narstega@gmail.com</u>
National Institute of Health, Department of Medical Sciences, Ministry of Public Health, Thailand
Watcharaporn Kamjumphol, <u>watcharaporn k@dmsc.mail.go.th</u>



WHO Collaborating Centre for Antimicrobial Resistance (AMR) Prevention and Containment (THA-89)

Clinical Epidemiology Unit, Department of Research and Development, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand

Field of Expertise of Collaborating Centre

- One health surveillance of AMR
- Surveillance of AMR, AMC, AMU, HAI and AMR Burden in human
- 3. Using WHONET for surveillance of AMR
- 4. Antimicrobial stewardship (AMS) practice and training
- Research on epidemiology of antimicrobial resistant infections, development of rapid diagnostics and clinical trial on therapy of antimicrobial resistant infections

Staff Members/Team Members

Director

Professor Visanu Thamlikitkul, MD

Surveillance, AMS, Research

Members

Assoc. Prof. Pinyo Rattanaumpawan, MD, PhD Surveillance, AMS, Research
Assoc. Prof. Methee Chayakylkeree, MD, PhD Fungal infection, AMS, Research
Assoc. Prof. Rujipas Sirijatuphat, MD Surveillance, WHONET, AMS, Research
Assoc. Prof. Pornpan Koomanachai, MD Surveillance, AMS and Research
Assist. Prof. Adhiratha Boonyasiri, MD Bioinformatics of AMR, AMS, Research
Assist. Prof. Walaiporn Wangchinda, MD Surveillance, AMS, Research
Technologists and research nurses on infectious diseases

Ongoing and Planned Activities

Ongoing Activities

- 1. One health surveillance of AMR
- 2. Surveillance of AMC, AMU, HAI and AMR Burden in human at local and national levels
- 3. Implementation and training WHONET for surveillance of AMR
- Antimicrobial stewardship (AMS): implementation and quality improvement including developing and implementing digital AMS at Siriraj Hospital, in-hospital training of relevant personnel, organizing annual AMS workshop for interested health personnel
- Research on epidemiology of antimicrobial resistant infections, development of rapid diagnostics and clinical trial of therapy of antimicrobial resistant infections, and one health surveillance of AMR
- Assisting responsible institutes to develop and implement Thailand National Plan on AMR 2023-2027
- 7. Participating WHO CC Network on TP5, 6b,c,e, 7, 8, 10, 11b,c,d, 12c

Planned Activities

- 1. Continue performing the aforementioned ongoing activities
- Perform the activities that are requested by SEARO and WHO

Examples of Recent Work

Integrated one-day surveillance of antimicrobial use (AMU), antimicrobial consumption (AMC), antimicrobial resistance (AMR), healthcare-associated infection (HAI), and antimicrobial resistance burden among hospitalized patients in Thailand.

Objectives: Surveillance of AMU, AMC, AMR, HAJ, and AMR burden are usually measured by time-consuming and expensive multiple separate longitudinal surveys. This study aimed to investigate feasibility and benefit of integrated one-day surveillance to estimate and monitor these parameters.

Methods: Integrated one-day surveillance of AMU, AMC, AMR, HAI, and AMR burden among hospitalized patients in 183 hospitals in Thailand stratified by locations of hospitals in all regions and size of hospitals was conducted. Data were collected from each patient who received antibiotic on a survey day.

Results: AMU prevalence was 51.5% among 23,686 hospitalized patients. The most commonly used antibiotic for infection prophylaxis and treatment was cefazolin and ceftriaxone, respectively. The most common infection was pneumonia. Community-associated infection (CAI) was observed in 64.9%, and 34.1% had HAL Prevalence of AMR was highest in A. baumannii infection (69%). AMR in bacteria was more prevalent among HAI than among CAI. Consumption of all antibiotics was 18,103 DDD. HAI prevalence was 14.0%. Health and economic burden were much higher in patients with antibiotic-resistant infection.

Conclusions: Integrated one-day surveillance of these important parameters (AMU, AMC, AMR, HAI, and AMR burden) among hospitalized patients is feasible and can be used for estimation and monitoring of such parameters in resource-limited settings.

Reference: Thamlitikul V, Rattoneumpewon P, Sirijatuphat R, Wongchinda W. Integrated one-day surveillance of antimicrobial use, antimicrobial consumption, antimicrobial resistance, healthcare-associated infection, and antimicrobial resistance burden among hospitalized patients in Thalland. J Infect 2020;91(1):98-106.

A noninferiority cluster-RCT on antibiotic post-prescription review and authorization by trained general pharmacists and infectious disease clinical fellows

Objective: To compare effectiveness of antibiotic postprescription review and authorization (PPRA) determined by infectious disease (ID) clinical fellows with that of trained general pharmacists.

Methods: Noninferiority cluster-RCT in 6 general medical wards was conducted at Siriraj Hospital in Bangkok, Thailand. Three wards were randomly assigned to intervention (pharmadist PPRA gr.), and another 3 wards were assigned to control (fellow PPRA gr.). Patients in study wards who received ≥1 doses of piperacillin/tazobactam, imipenem/cilastatin, or meropenem were included. Noninferiority margin was 10% for favorable clinical response and 1,5 defined daily doses (DDDs) for targeted antibiotics.

Results: 303 patients were enrolled in pharmacist PPRA gr and 307 patients in ID fellow PPRA gr. Baseline and clinical characteristics were similar in both groups. Difference in favorable response of patients who received targeted antibiotics (pharmacist PPRA gr minus fellow PPRA gr) was 5.15% (95% CI -2.69% to 12.98%); difference in DDD of targeted antibiotics (pharmacist PPRA gr minus fellow PPRA gr) was 0.62 (95% CI, -1.57 to 2.82). No significant difference in DDD of overall antibiotics, 28-day mortality, 28-day ID-related mortality, favorable microbiological outcome, or antibiotic-associated complications were observed.

Conclusions: Noninferiority of pharmacist PPRA in terms of favorable clinical response was confirmed, however, noninferiority in targeted antibiotic consumption could not be established. Therefore, using trained general pharmacists instead of ID clinical fellows could be an alternative for PPRA in a resource-limited setting.

Reference: Rattanaumpewan P, Upapan P, Thamlikhtul V. A noninferiority clusterrandomized controlled trial on antibiotic postprescription review and authorization by trained general pharmacists and infectious disease clinical fellows. Infect Control Hosp Epidemiol 2018;39(10):1154-1162.





UNK-323 WHO Collaborating Centre on Genomic Surveillance of Antimicrobial Resistance

Centre for Genomic Pathogen Surveillance(CGPS), University of Oxford, Oxford, United Kingdom

Field of expertise of the CC

The adoption and utility of molecular and genomic methodologies and data interpretation to strengthen in country surveillance and response systems for AMR

- Technical support packages for the implementation of genomics within national control programmes
- Genomic and digital epidemiology for data interpretation and translation for infection control strategies and policy making
- Development of web-based data applications for local value and collation and presentation of data at national and international levels
- Training and technical support for testing, analysis and interpretation of genomic and allied epidemiological data
- Technical specifications for the production and validation of genomic catalogues for signatures and diagnostics of AMR with allied phenotypic and other metadata

Team Members



Director, Prof David Aanensen David.Aanensen@cgps.group



Strategy, Heather Shane Heather.Shane@cgps.group



Management, Diana Connor Diana.Connor@cgps.group

Ongoing and Planned Activities

Ongoing Activities

- · Capacity building in genomic surveillance
- · Curation of genomic archive data for public health
- Delivering gold-standard knowledge bases for genomic identification of AMR and global monitoring
- · Development of training programmes for technical support
- · Bioinformatics research and development for surveillance
- · Genomic and digital epidemiology

Planned Activities

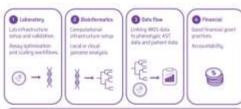
- Capacity and data landscaping / mapping for genomic capacity / data within reference laboratories
- Data system and research effort landscaping for phenotype/genotype capacity efforts and mapping
- Country strengthening for laboratory and data capacity to bring genomics to national control and surveillance programmes
- Guidance for GLASS for development, inclusion and maximal utility of whole genome sequence data.

Capacity Building

Data Applications: Genomic Processing and AMR

Situational Risk Awareness;

Technical Support Packages - Implementation of Genomics







Nigeria | India | Colombia | Philippines

Integrating genomic data with national control programmes Surveillance of priority pathogens

Data integration and reporting to / from sentinel laboratories Clinical Infectious Disease Supplement 1 Dec 2021, Vol 73, Supp 4: https://academic.oup.com/cid/article/73/Supplement_4/S255/6447004



Push-button bioinformatics –raw data to results / standard reports Prediction of AMR from genomic data – collation of markers Clustering of genomes – transmission https://pathogen.watch



UNK 105: WHO Collaborating Centre for Reference & Research on Antimicrobial Resistance and Healthcare Associated Infections

UK Health Security
Antimicrobial Resistance and Healthcare Associated Infections (AMRHAI) Reference Unit

London, United Kingdom

Field of expertise of the CC

The Antimicrobial Resistance and Healthcare Associated Infections (AMRHAI) Reference Unit withint he United Kingdom's Health Security agency is England's national reference laboratory for investigation of antibiotic resistance in, and characterisation of, healthcare-associated bacterial pathogens. We have expertise in:

- Use of phenotypic and genotypic methods to type bacterial isolates, thereby defining outbreaks and identifying transmission pathways
- Determining antibiotic susceptibility to a wide range of antimicrobials using a variety of phenotypic methods and inferring likely resistance mechanisms by interpretive reading of antibiograms
- Detection of antibiotic resistance and virulence markers of public health importance using genotypic methods to monitor their dissemination
- Provision of advice on outbreak investigation, antimicrobials that may be appropriate therapy and on any public health risks
- · Management advice for complex AMR infections

Key staff involved / Team members



 Katie Hopkins [Lead Clinical Scientist, Antimicrobial Resistance & Mechanisms Service, AMRHAI]



 Colin Brown [Consultant Medical Microbiologist and Head of the Healthcare Associated Infections and Antimicrobial Resistance Division]



 Daniele Meunier [Clinical Scientist, Antimicrobial Resistance & Mechanisms Service, AMRHAI]



 Carole Fry [Infection Prevention & Control Lead, Healthcare Associated Infections and Antimicrobial Resistance Division]

In addition AMRHAI sits within a multi-professional HCAI and AMR team comprising of national surveillance leads, epidemiologists, healthcare economists and modellers, medical microbiologists, IPC professionals, environmental microbiologists, pharmacists, bioinformaticians and clinical laboratory scientists

Examples of recent work

WHO Academy module

 Provided expert scientific and technical support in collaboration with Prof. Olga Perovic (WHO CC SOA-43) via preparation of a module on 'Laboratory standards for surveillance of antimicrobial resistance' describing the role of the national reference laboratory in AMR surveillance, the importance of a quality management system and of participating in and organizing external quality assessment programs for AMR

Sharing of UK experience of surveillance for AMR and healthcare associated infections with international colleagues

- Shared experience of implementation of surveillance for healthcare associated infections with Ukraine health authorities via participation in webinar and Q&A session
- Shared UK experience and best practice in event cohosted by Turkey 'One Health meeting on coordination and use of genomic sequencing for antimicrobial resistance' via delivery of three presentations and participation in panel discussions

Provision of expert advice

- Attended the WHO expert meeting on the global strategy for infection prevention and control and subsequent participation in Working Groups
- Supporting international COVID-19 IPC policy discussions e.g. presenting UK data at WHO IPC Guideline Development Group (GDG) and Global IPC Network, including participation on the Public Health Emergencies Working Group working on IPC response to Ebola Virus Disease and cholera
- Helped steer Saudi Arabian public health agency on national AMR action plan creation
- Linking the National Center for Disease Control & Public Health, Georgia with UKHSA's National Collection of Type Cultures (NCTC) to provide training/mentoring in bacterial lyophilization

Review of documentation

- · Provided external review of GLASS Report 2022
- Contribution to the UK Department of Health and Social Care (DHSC) comments on the draft WHO document 'Roadmap for the WHO Euro region for AMR, 2023-2030'

Email: colin.brown@ukhsa.gov.uk; katie.hopkins@ukhsa.gov.uk

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WHO Collaborating Centre for Surveillance, Epidemiology and Control of Foodborne Diseases and Enteric, Fungal Pathogens (USA-417)



FLIGHT Fellow

Institution: Mycotic Diseases Branch, Centers for Disease Control and Prevention
Atlanta, United States of America

Field of expertise of the CC

The vision of CDC's Mycotic Diseases Branch (MDB) - Global Fungal Disease Program is to improve global preparedness to prevent, detect, and respond to fungal disease threats.

- MDB includes Epidemiology, Laboratory, Data Quality, and Administrative teams devoted to the prevention and control of fungal diseases globally
- MDB supports a variety of fungal public health activities with global and domestic partners to build laboratory, surveillance, and treatment capacity.
- MD8 works with key stakeholders to investigate fungal outbreaks and help to prevent spread of existing and emerging fungal threats.
- MDB provides reference testing for priority fungal pathogens on request from international partners

Staff involved / Team members Tom Chiller Branch Chiller Branch Chiller Branch Chiller Global Health Coordinator Narda Medina Samuyoa Tocheical SME (contractor) Hatim Shafiq Fublic Health Advisor Fungal & Lab SME Narcy Chow Funginet Lead Narcy Chow Funginet Lead

Ongoing and planned activities

Ongoing activities

- MDB currently supports fungal disease activities across the globe, including 16 CDC funded projects with global partners to:
 - · Strengthen laboratory capacity to identify priority fungal pathogens
 - · Increase access to rapid tests for HIV-associated fungal diseases
 - Improving/building fungal disease surveillance systems.
 - Build fungal genomic epidemiology/bioinformatics capacity
- Citizen science project investigating geographic spread of azoleresistant aspergillus through air sampling
- Facilitatation of technical working group for Sporothrix Brasiliensis in the Americas

Planned activities

- Creating Regional Fungal Laboratory Center of Excellence in Thailand.
- · Expanding global capacity for antifungal susceptibility testing
- · Creation of a network of fungal genomic epidemiology centers
- Expand efforts to "End Cryptococal Meningitis Deaths by 2030"
- Improving implementation of WHO-recommended point-of-care diagnostics for common fungal infections
- Investigation of strategies for C, auris decolonization and wastewater surveillance
- Increase awareness of neglected fungal diseases through international working groups, scientific publications, and trainings

Examples of recent work



Antimicrobial Resistance
Projects in 13 countries to
build lab capacity for fungal
identification and antifungal
wesceptibility testing

Access to Point-of-Care Diagnostics

Efforts to improve implementation of cryptococcal screening and CM treatment programs in Tanzania, Zimbabwe, Botswana, Uganda, Eswatini, Lesotho, South Africa, Nigeria, Senegal, Zambia, & Zimbabwe

Training & Education

With support from Clinton Health Initiative and UNITAID, hosted 25 Project ECHO training sessions on Advanced HIV Disease, including cryptococcal screening and treatment, reaching >2,851 participants from 132 countries

https://hsc.unm.edu/echo/partner-portal/echos-initiatiyes/cdc-hly/

MDB collaborates closely with international public health organizations including

World Health Organization (WHO), Pan-American Health Organization (PAHO), COMISCA, and numerous other organizations



USA-449: WHO Collaborating Center for Global One Health and Antimicrobial Resistance Initiatives

Institution: North Carolina State University, College of Veterinary Medicine

Raleigh, North Carolina, USA

Field of expertise of the CC

We are expert in the feild of antimicrobial resistance, molecular epidemiology, food safety and Global Health

The College of Veterinary Medicine enhances animal and human health and well-being through the education and advanced training of veterinarians and comparative biomedical scientists and provides leadership in veterinary care, biomedical research and outreach through innovation and inter-disciplinary partnerships

Through the Global Health Program which is an Integral part of the WHO CC, we are striving to improve human, animal, and environmental health worldwide using the One Health Approach.

Faculty involved



 Dr. Paula J Fedorka-Cray, PhD Professor and Head, Department of PHP, CVM.



Dr. Megan Jacob, PhD
 Professor and Director of Diagnostic Laboratories,
 Department of PHP, CVM.



 Dr. Shivaramu Keelara, PhD Adjunct Assistant Professor, Department of PHP, CVM.



 Dr. Sid Thakur, PhD
 Professor and Executive Director of Global One Health Academy, Department of PHP, CVM.

Ongoing and planned activities

Ongoing activities

- Support WHO's capacity building activities to strengthen the integrated surveillance of AMR in foodborne pathogens.
- Support WHO's effort for the implementation of the Tricycle project in member states
- Support WHO in developing inforantic tools to enhance data collection for use in supplicance of AMR/AMIL
- collection for use in surveillance of AMR/AMU

 Strengthening AMR surveillance in the animal sector in Malawi.
- Hosting and training visiting scholars from LMIC's in the feild of AMR and whole genome sequencing

Planned activities

- Continue support for implementation of the Tricycle project in the member states.
- Adaptation of Tricycle protocol for carbapenemase resistant pathogens surveillance using a one health approach.
- Improve the laboratory capacity and technical expertise in the LMIC's.
- Extend the WGS support to understand the emerging AMR pathogens of global health importance.
- Development of courses for veterinarians, physicians and researchers on AMR surveillance and global health.

Case study / example of recent work

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Optimizing a Screening Protocol for Potential Extended-Spectrum β-Lactamase Escherichia coli on MacConkey Agar for Use in a Global Surveillance Program

August F. Janes T. T., Simon arts: Entering T. T., Aust States Flore T., Origin B. Mythaus Sylvanis T., Paule | Federate State T

Objective: Evaluate a widely available microbiological medium and simple methodology to detect potential ESBL-producing E. coli from different sample types. If effective, this medium could be used as a screening methodology in a global surveillance program, particularly in LMIC, with biological matrices from human clinical specimens, human and animal feces, and environmental water samples.

Methods: MacConkey agar was purchased from eight manufacturers representing seven countries (United States [U.S.]-1, U.S.-2, China, India, Italy, France, Canada, and United Kingdom (UK)), prepared with 4 μg/ml TOX or AXO and stored at 4°C. Reference strains ATCC EC25922 (negative control), presumptive positive (pp) ESBL EC13457 (+TEM/CMY-2), and ESBL EC10455 were evaluated on MacConkey agar. U.S.-1 with 2 or 4 μg/ml TOX was evaluated for detection of ESBL E. coli from poultry cecal samples (n=30); all isolates were confirmed E. coli using matrix assisted laser desorption ionization-time of flight (VITEK MS MALDI-TOF) and susceptibility tested using the VITEX2

Results: Results indicated the recovery of E. coli 13457 from four MacConkey agar manufacturers was reduced by up to 4 log CFU/ml, and phenotypic differences in colony size and color were apparent for each manufacturer for control E. coli strains. A true ESBL, NC11, was not reduced with 4 µg/ml cefotaxime. From ceca and water, potential ESBL E. coli isolates were only confirmed from MacConkey agar with 4 µg/ml cefotaxime, where 45% and 16.6% of E. coli isolates phenotypically expressed ESBL production.

Summary: Results from our study suggest MacConkey agar with a third-generation cephalosporin used as selective pressure, particularly 4 µ/ml cefotaxime, is a reliable screening method for the recovery of ESBL-producing E. coli from fecal and water sources and could be an inexpensive, reliable method for use in LMIC, particularly if the product was standardized. Continued work to optimize methods acceptable to the environmental sector are warranted, and diagnostic sensitivity and specificity should be evaluated. Further characterization of isolates with more robust molecular methods would aid in better epidemiological assessment of transmission and should be considered when available.

The protocol was adapted by WHO for the implementation of Tricycle project. https://www.who.in/jublications//iten/who.integrated.global.surveillance-on-osbproducing-e-osb-using-a-ose-health-approach

Space for additional information:

Contact information: Paula J Feforka-Cray (picray@ncsu.edu) and Megan Jacob (mejacob@ncsu.edu)

WHO Collaborating Centre for Antimicrobial Resistance and Stewardship [USA-451]

Stanford Antimicrobial Safety and Sustainability Program (SASS)

Institution: Stanford University School of Medicine Stanford, California, USA



Field of expertise of the CC

Antimicrobial stewardship and Education

Mission statement: "Our mission is to improve patient outcomes and safety now and, in the future, by promoting the optimal use and sustainability of antimicrobials through engagement with local, national, and international stakeholders, by empowering all to be stewards of this precious resource, and by training the next generation of stewardship leaders."



Team members





- Marisa Holubar, MD, MS
- David Ha, PharmD, BCIDP

SASS
 Team



Ongoing and planned activities

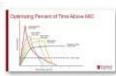
- Developed online antimicrobial stewardship course with WHO-EURO (described below)
 - · Planned activity: updating content
- Developed "Antimicrobial Stewardship Interventions: A Practical Guide"
 - · Intended audience: clinicians, stewardship programs, administrators
 - Designed as a resource to supplement additional AMS training and to facilitate decisions regarding which AMS interventions to implement in healthcare facilities.
 - · Planned activity: updating content
- Developed and led online and in-person training regarding AMS at the request of WHO in many regions, countries
- Including: North Macedonia, Jordan, Turkey, Ukraine, Armenia, Uzbhekistan, multinational meetings
 Provided technical review of national guidelines for common infections/COVID-19 and sub-regional WHO AMS
- Participating in development of new WHO Academy course: Antimicrobial Resistance and Antimicrobial Use Surveillance (ongoing)

Webinar Series with WHO Country Office Ukraine

We have developed and delivered educational material to promote AMS program development at request of WHO

- Most recently developed a webinar series in conjunction with WHO country office in Ukraine
- We solicited cases from clinicians attending these seminars in order to develop relevant content and stimulate engagement
- · Material developed:
 - Introduction to AMS
 - AMS principles
 - AMS metrics
 - Pharmacology considerations for clinicians
 - Appropriate use of antibiotics for surgical prophylaxis and the management common infections: pneumonia, urinary tract infections, gastrointestinal infections





Please contact us for questions!

mholubar@stanford.edu and dha@stanfordhealthcare.org

@StanfordASP@Marisa_Holubar @DHpharmd

Antimicrobial Stewardship Course with WHO-EURO

We developed, in conjunction with WHO-EURO, the online antimicrobial stewardship course depicted below.

- Intended audience: Clinicians new to antimicrobial stewardship
- Demonstrates how to incorporate antimicrobial stewardship principles into management of common infections in both the clinic and the hospital.
- Highlights diagnostic stewardship for clinicians- appropriate collection of specimens for microbiologic diagnostics (culture) and interpretation of results
- Available on OpenWho in English, French, Italian, Russian, Spanish, and Macedonian









Institution: National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention (CDC), Atlanta, USA

Formerly USA-281, Redesignated September 2022

Field of expertise of the CC

The CC supports and strengthens technical and programmatic Antimicrobial Resistance (AMR) capacities. USA-458:

- Supports activities to strengthen Member States' national capacity for AMR surveillance and continuous development and implementation of the WHO Global AMR and Use Surveillance System (GLASS) and regional surveillance networks
- Provides technical assistance to strengthen the ability of laboratories around the world to detect, monitor and report bacterial antimicrobial resistance, with special attention to emerging resistance mechanisms
- Supports implementation of integrated strategies and activities to reduce the emergence and spread of AMR

Staff involved / Team members



Dawn Sievert, PhD, MS (Lead)



Fernanda Lessa, MD, MPH



Jacob Clemente, MPH



Rachel Smith, MD, MPH



Jason Folster, PhD



Allison Brown, PhD, MPH

Ongoing and planned activities

Ongoing activities

- Support development and implementation of national surveillance programs in alignment with GLASS through capacity building activities and capacity assessments
 - Expansion of national surveillance systems and reporting to GLASS
 - Supporting PAHO in the inaugural pilot of the WHO attributable mortality of AMR BSI study in Uruguay
 - Serving on the expert committee for the development of WHO's nationally representative surveys for AMR surveillance (adjunct to routine GLASS activities)
 - Research and innovation for new AMR detection and surveillance methods in Brazil
- Provide training to strengthen the AMR laboratory capacities towards participation in GLASS
 - WGS capacity assessment and technical assistance for bioinformatics in Argentina and Chile
 - Microbiological and molecular diagnostic testing and reporting practices for 8. pertussis in Brazil and Mexico, 5. pneumoniae in Indonesia, and N. meningitidis in Burkina Faso
 - Water quality and laboratory testing trainings for E. coli and ESBL E. coli in Kenya
 - Culture, isolate preservations, AST (Etest), and clinical and data management trainings for EGASP in Cambodia
 - EGASP implementation training for sites in Cambodia, Philippines, Thailand, South Africa, and Uganda

Ongoing activities (continued)

- Support development, adaptation and implementation of integrated strategies to reduce the emergence and spread of multidrug-resistant organisms associated with healthcare in alignment with WHO standards and recommendations
 - Publicly available lab capacity assessment tool covering lab staffing, testing availability, workflows, current laboratory and IPC communication practices¹
 - Templates for mCIM validation, ICT verification, Xpert verification, RT-PCR validation
 - Guidance for testing, prevention, and control of healthcare-associated AMR pathogens

Planned activities

- · Develop and conduct trainings
 - · Testing for healthcare-associated AMR pathogens
 - AST for S. pneumoniae in hospital laboratories and data collection and quality control trainings in Indonesia
 - Wet and dry lab WGS for enteric pathogens in Malaysia, New Zealand, Philippines, Taiwan
 - Data collection training (household survey) for E. coli in the environment and collection, isolation, and characterization of ESBL E. coli in Kerwa
 - Typhoid case study development for integration into Pakistan FELTP
- · Develop guidance and tools
 - · WGS guidance for HAI/AR pathogens
 - · WGS/bioinformatics capacity survey
- Participate in the expert working group for the AMR diagnostics initiative strategic framework

Contact

Dawn Sievert and Jacob Clemente through CDC's Global Antimicrobial Resistance Laboratory & Response Network (GARLEN Dcdc.gov) and include "USA-458" in the subject line.

Lab Assessment of Artibiotic Resistance Testing Capacity (LAARC), https://www.ob.ass/stragresstance/ntf-asta-tios/sess.html



WHOCC for Surveillance of Antimicrobial Resistance [USA-484]

Institution: Brigham and Women's Hospital

Boston, United States

Field of expertise of the CC

Since 1985, our team has provided epidemiological guidance, tehcnial support, and informatics tools to support local, national, regional, and global surveillance of antimicrobial resistance.

Our WHONET software is used in over 130 countries supporting surveillance activities in thousands of human and animal health, food, and environmental laboratories. We provide software development, customizations, training, and support.

We also provide strategic and technical guidance to WHO, FAO, Ministries of Health, the UK Fleming Fund, MSF, and many others to build laboratory and surveillance capacity.

Staff involved / Team members

- Dr. John Stelling
- Dr. Thomas F. O'Brien
- Dr. Ahmed Aboushady
- Mr. Adam Clark
- Mr. Ameya Kasbekar
- Mr. Robert Peters

Ongoing and planned activities

Ongoing activities

- · Desktop WHONET and BacLink software development
- · Online WHONET software development
- WHONET-DHIS2 interoperability
- Support to the UK Fleming Fund CAPTURA, RADAAR, MAAP, and WHONET strategic alignment grants.
- Software customizations to support WHO GLASS and FAO AMR surveillance modules
- · Support to COMBAT-AMR, CDC, MSF, and Ministries of Health
- WHONET Training Center and online certification course

Planned activities

- · MacOS, Linux, and Android-compatible version of WHONET
- WHONET-DHIS2 implementations
- New WHONET software features to support clinical reporting, automation, country-specific reports, and BacLink data import capabilities
- Support to the new FAO InFARM and GISSA surveillance initiatives
- · Enhancement of WHONET features for enviroinmental samples

Example of recent work

UK Fleming Fund

Much of our recent efforts support three projects funded by the UK Aid Fleming Fund.

- CAPTURA, led by the International Vaccine Institute: We have supported twelve countries in Southeast and South Asia to build local and national capacity to support data management capacity. This has involved the identification, collection, collation, and import into WHONET of historical data (3-5 years) from participating networks. We have supported data analysis, interpretation, and reporting.
- RADAAR, led by the International Vaccine Institute. Guidance on the use of data to support strategic and technical policymaking with a particular focus on the role and value of a regional approach to capacity-building, recruitment, mentoring, experience sharing, best practices, and working with stakeholders to translate findings into interventions and assessment of those interventions.
- Fleming Fund WHONET Strategic Aligment Grant covering three areas: 1) Training materials, strategies, activities, and regional

approaches to training-of-trainers and ongoing provision of training; 2) Technical support through materials, Community of Practice Discussion Forum, troubleshooting, debugging, software enhancements, and regional approaches to provision of technical support; and 3) WHONET web presence through new software development and interoperability with existing systems such as DHIS2.

WHONET Use around the world



www.whonet.org

Please contact us at help@whonet.org