Framework for regional data sharing and analysis of antimicrobial resistance and use data for policy, advocacy, and response

Fleming Fund RADAAR Project

14 July 2021

John Stelling
Emergence of antimicrobial resistance

Appearance

Dissemination

Establishment

Transfer between sectors

14 July 2021
One Health view of antimicrobials and resistance

After Linton AH (1977), modified by Irwin RJ - 2012 version
# AMR Surveillance objectives

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Local</th>
<th>National</th>
<th>Regional</th>
<th>Global</th>
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<td><strong>Policy and advocacy</strong></td>
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<td>Priority setting and funding</td>
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<td>Awareness and education</td>
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<td><strong>Epidemiology of resistant microbes</strong></td>
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<td>Recognition of emerging threats</td>
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<td>Treatment guidelines</td>
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<td>Response to emerging threats</td>
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Current global initiatives
United Nations

• High-Level Meeting on AMR - 2016
• Inter-Agency Collaborative Group on AMR (IACG)
• One Health Global Leaders Group on AMR (GLG)
• Sustainable Development Goals
  • New indicators for MRSA and ESBL *E. coli* in blood
World Health Organization

- WHO GLASS modules
  - Core AMR surveillance
  - Core AMC surveillance
  - EAR – Emerging Antimicrobial Resistance
  - EGASP – AMR in *Neisseria gonorrhoeae*
  - AMR in Candidemia
  - Attributable mortality in bacteremia
  - Hospital Antimicrobial Use Point Prevalence Study
  - ESBL *E. coli* TriCycle

- Pathogen- or subject-specific programs
  - AGISAR (Advisory Group for Integrated Surveillance of Antimicrobial Resistance)
  - Global Foodborne Infections Network (GFN)
  - WHO/IUTLD TB
  - HIVResNet
  - Malaria
Food and Agriculture Organization of the UN

- FAO AMR Surveillance guidelines
  - Published: AMR in healthy animals
  - Advanced draft: AMR in diseased animals and in aquiculture
  - In development: AMR in animal environment and Antimicrobial use

- FAO-ATLASS: FAO Assessment Tool for Laboratories and AMR Surveillance Systems

- FAO-PMP-AMR: FAO Progressive Management Pathway for AMR

- FAO Technical Working Group on AMR Data Management
World Organisation for Animal Health

CHAPTER 6.8.
HARMONISATION OF NATIONAL ANTIMICROBIAL RESISTANCE SURVEILLANCE AND MONITORING PROGRAMMES

CHAPTER 6.4.
DEVELOPMENT AND HARMONISATION OF NATIONAL ANTIMICROBIAL RESISTANCE SURVEILLANCE AND MONITORING PROGRAMMES FOR AQUATIC ANIMALS
United Nations Environment Programme

What are priority areas for management of Antimicrobial Resistance (AMR) in the Environment?

Advancing the One Health Response to Antimicrobial Resistance

Priority Areas for Management of AMR in the Environment
Entry of residues, resistant microorganisms and antimicrobial resistant genes into the environment

- Antimicrobial Resistance in the Environment is a complex problem, and it will require coordinated solutions.
- The source of AMR in soil and water are numerous and extend from production of antimicrobials, through usage and waste management.
- Every identified pathway (arrows) of contamination also present a target for intervention and measures for mitigation.
- UNEP is increasing coordination and cooperation efforts.

Image source: https://www.unenvironment.org

7) Discovery, Knowledge Sharing

Address knowledge gaps and improve monitoring and surveillance to identify and quantify primary sources of environmental pollution that contribute to the spread and emergence of antimicrobial resistance and share findings globally.
- Good quality data collection and management
- Best practices for laboratories to detect AMR threats
- Coordinated data sharing and harmonized analysis
- Expert consultations

Antimicrobial Resistance is a Global Human, Animal and Environment Health Crisis.

There is no time to waste.
Antimicrobial resistance; an emerging crisis

Antimicrobial Resistance Multi-Partner Trust Fund

Combatting the rising global threat of AMR through a One Health Approach
FAO-OIE-WHO Tripartite collaborations

- **TISSA**: Tripartite Integrated Surveillance System on AMR and AMU
- **World Antimicrobial Awareness Week** coordinated messages and activities
Regional approach to AMR containment

• Value of the regional approach
  • Advocacy: Ownership, relevance, and sustainability
  • Epidemiology: Regional view and benchmarking of antimicrobial use and resistance trends
  • Resistance containment: Regional coordination of response strategies and initiatives and cooperation with national authorities
  • Capacity-building: National strengthening and standardization of approaches, best practices, lessons learned, mentoring, technical support, feedback

• Need for two regional frameworks
  • Framework for data collection, sharing, and analysis
  • Framework for translating data into action
Framework for regional data collection, sharing, and analysis
Framework 1 – Data…and other information needs

- Tracking evolving AMU practices and AMR threats
- Systems approach to characterize organizational structures, capacities, relationships, responsibilities
- Registries and inventories of legislation, regulations, policies, campaigns, activities
- Respect for privacy issues in human health and in food production
- Data type considerations
  - Ongoing versus periodic versus snapshot information needs
  - Aggregate statistics versus patient- or isolate-level reporting
  - Local, national, regional, and global data and literature sources
  - Public, private, academic, industry, etc.
Antimicrobial resistance surveillance models

- Alert organism surveillance
- Enhanced routine surveillance
- Targeted surveillance protocols and surveys
WHONET analysis, alert, and report features
Antimicrobial use surveillance models

• Aggregate facility or national statistics – “Antimicrobial Consumption”
• Patient-level “Antimicrobial Use”
• Metrics:
  • Quantitative
  • Qualitative
Global antibiotic consumption rates: time series 2000-2015

Establishing a regional data sharing framework

• Regionalization of national initiatives – from bottom up
  • AMR: EARS-Net, CAESAR, EFSA, ReLAVRA
  • AMC: ESAC-Net, EFSA, WPRACSS

• Regionalization of global initiatives – from top down
  • WHO GLASS
  • FAO (with initial development in Asia)
  • OIE

Direct links between global and national authorities are valuable to get started - but for the long term, the regional approach is generally more sustainable, relevant, and impactful
IT approaches to support regional surveillance

• Region-specific software development
  • Europe: ECDC TESSy for EARS-Net, ESAC-Net, and HAI-Net
  • Europe: WHO CAESAR and WHO EURO AMC Network
  • Latin America and Caribbean: PAHO PLISA for ReLAVRA
  • Western Pacific: WPRO WPRACSS

• Regionalization of global platforms
  • WHO GLASS, FAO, OIE WAHIS, OIE Global Database on Antimicrobials Intended for Use in Animals
  • FAO/OIE/WHO Tripartite: TrACSS, TISSA
  • There should be minimal core protocols followed by all countries to support global reporting: Data sources, reporting frequency, specimen types, pathogens, antimicrobials, animal species, dashboards, reports
  • However, there should be wide scope for customization reflect regional priorities and consensus agreements
Some current IT initiatives

- Global initiatives
  - WHO GLASS, OIE WAHIS, FAO, TISSA, TrACSS
- Microbiology laboratory information systems
  - Free systems: LabBook (Fondation Merieux), BLIS, Bika
  - Free systems in development: Mini-LIMS (Doctors Without Borders), SEDRI-LIMS (SEDRIC, Wellcome Trust), SENAITE, OpenELIS
  - Veterinary LIMS: SILAB (IZSAM with support from FAO)
  - Commercial systems
- Data analysis and public health reporting
  - WHONET and SaTScan
  - DHIS2 and AMR: WAHIT, Norway, India, Senegal, WHONET, (Viet Nam)
  - SORMAS
  - OpenLDR
  - AMASS
- WHO AMR Collaborating Center Network
  - Coding and antibiotic interpretation standards
Importing WHONET results to DHIS2

WHONET Standard reports

1. DHIS2 - Isolate listing summary - Laboratory + Country by Week
2. DHIS2 - Isolate listing summary - Laboratory + Organism by Month
3A. DHIS2 - Susceptibility summary - Gram negative Organism + Laboratory by Month
3A. DHIS2 - Susceptibility summary - Gram positive Organism + Laboratory by Month

WHO GLASS Export

Save as type: WHO GLASS-AMR
Data year: 2020
Data set: Data set 1
Use a date filter
Export to DHIS2

Display of Data Set and Events – WHO GLASS

Example

Dashboard display

Map edited for confidentiality
Data ownership, privacy, and data use agreements… and trust

• In most instances, data platform coordinators are NOT considered to be the data owners, but rather data stewards supporting the needs of data contributors under defined data sharing and use agreement
  • Regional requirements (GDPR, HIPAA, etc.) and agreements on data ownership, use, and access

• Differences in confidentiality concerns between human and animal data
Framework for translating data into action
Framework 2 - Priorities

• What actions are needed?
  • What data are needed to support those actions?
• What data exist?
  • What can be done with these data? Strengths, deficiencies?
• What are the information gaps?
  • What are possible strategies to address these gaps?
• What partners and skillsets are needed?
Strategic versus technical policymaking

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<thead>
<tr>
<th>Strategic policymakers</th>
<th>Technical policymakers</th>
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<tbody>
<tr>
<td>· Advocacy - resistance is major public health threat, heterogeneous issues, and worsening</td>
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<tr>
<td>· Strengthen organizational structures and build capacity</td>
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<td>· Establish coordination mechanisms and communication pathways</td>
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<td>· Define public health priorities and resource needs according to disease burden</td>
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<td>· Allocate sufficient financial and human resources</td>
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<td>· Advance regulatory and legislative agenda for antimicrobial resistance containment</td>
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<td>· Establish high-level objectives, strategies, and monitoring and evaluation metrics for program success</td>
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<tr>
<td>· Translate high-level objectives and strategies into implementation plans</td>
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<td>· Detect and contain emerging resistant pathogens, including outbreaks, in real time</td>
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<td>· Assess and update standard treatment guidelines in human and animal settings</td>
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<tr>
<td>· Benchmark antimicrobial use, infection control, and laboratory test practices across healthcare facilities and communities with investigation and guidance on improvements</td>
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<td>· Benchmark resistance findings and investigate outlying and unexpected findings</td>
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<td>· Develop educational and advocacy materials targeted to healthcare workers, policy makers, food producers, and the general public</td>
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Priority action areas

• Translating data into action for capacity and continuous quality improvement
  • Advocacy and awareness for health services delivery
  • Improved capacity for clinical and laboratory diagnostic services
  • Improved capacity for data management, analysis, and interpretation

• Translating data into action for resistance containment
  • Advocacy and awareness for antimicrobial resistance containment
  • Disease prevention
  • Improved use of existing antimicrobials and treatment options
  • Decreased transmission of resistant pathogens
Partners in resistance containment

• Governmental authorities: Ministries of health, agriculture, animal welfare, finance
• Human and animal healthcare delivery
• Food production professionals
• Pharmaceutical and diagnostic industry
• Civil society: media representatives, patient advocacy groups
• Nongovernmental, academic, and research organizations
Data visualization, communication, and dissemination

- Results, conclusions, and recommendations must be presented in a variety of ways with content and formatting customized according to the needs of priority audiences
  - General public
  - Strategic stakeholders
  - Technical stakeholders
  - Public health researchers
AMR Containment in the Asian context
Governance framework

- **ASEAN**
  - Regional Strategy on AMR Communication and Advocacy
  - ASEAN Leaders’ Declaration on AMR

- **SAARC**
  - AMR Technical Advisory Group of the South Asian Association

- **Nongovernmental organizations**
  - Asia Pacific Society of Clinical Microbiology and Infection
  - ReACT Asia Pacific
  - Australasian Society for Infectious Diseases

- **Other agencies with interest in the region**
  - UK Fleming Fund
  - Japan Agency for Medical Research and Development
  - Global Antibiotic Research and Development Partnership
  - Global Health Security Program (FAO/USAID)
Conclusions

• The threats and challenges of AMR are complex, diverse, and evolving
  • Much has already been accomplished!
  • But much remains to be done – promotion, coordination, standardization, interventions – and regional approaches are fundamental for relevance, ownerships, sustainability, and impact

• Framework for regional data collection, analysis, and interpretation
  • Based in governmental and intergovernmental structures, but in partnership with nongovernmental agencies
  • Should include traditional surveillance data, but also information on resources, activities, structures, accomplishments

• Framework for translating data to action
  • Improved knowledge, capacity, prioritization
  • Improved disease prevention, antimicrobial use, and decreased transmission
  • Diverse partners are needed! A broad coalition of governmental, nongovernmental, industry, and civil society partners