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

Fleming Fund RADAAR Project

9 June 2021
John Stelling
Emergence of antimicrobial resistance

Appearance

Dissemination

Establishment

Transfer between sectors

30 June 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>Disease burden</td>
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<td>Treatment guidelines</td>
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<td>Response to emerging threats</td>
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<td>Assessment of interventions</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?

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
  – Identification, confirmation, and notification of **new and emerging microbial threats**, often based on a national lists of “notifiable laboratory results”

• Enhanced routine surveillance
  – Ongoing collection and analysis of **all routine diagnostic samples, organisms, and antibiotics** in real-time with active analysis and action
  – Identification of **priority strains, outbreaks, trends in infection and resistance**
  – **Laboratory capacity-building**

• Targeted surveillance protocols and surveys
  – **Priority scientific, policy, or clinical issues**: May include additional action patient identification and sampling, clinical details (diagnosis, treatment, outcome, burden of disease estimates), and laboratory testing
  – These studies provide value details on priority issues, but they are often labor- and resource-intensive and not sustainable
WHONET analysis, alert, and report features
Antimicrobial use surveillance models

- Aggregate facility or national statistics – “Antimicrobial Consumption”
- Patient-level “Antimicrobial Use”

- Data sources
  - National import manifests, insurance schemes, pharmacy and clinic records, patient interviews
  - Governmental, nongovernmental including industry

- Metrics:
  - Quantitative:
    - Antimicrobials imported, purchased, prescribed, dispensed, administered
    - Volume by weight, costs, DDDs, DDDvet, DCDvet, DDDvet per kg of meat
  - Qualitative:
    - Appropriate of use
    - Knowledge, beliefs, practices
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, HAI-Net
  • Europe: RIVM CAESAR database
  • 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 a core minimal set of data collection models followed by all countries to support minimal global standardization and reports, but there should be wide scope for regional customization for greatest relevance, ownership, sustainability, and action
    • Data sources, specimen types, pathogens, antimicrobials, animal species, dashboards, reports, etc. and surveillance contexts to reflect national and regional consensus agreements and priorities
    • Possibility of automated data management, notifications, and reports to facilitate real-time program monitoring, investigations, and response
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: DisaLab

- **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**

- DHIS2 - Isolate listing summary - Laboratory + Country by Week
- DHIS2 - Isolate listing summary - Laboratory + Organism by Month
- DHIS2 - Susceptibility summary - Gram negative Organism + Laboratory by Month
- 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**

**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
  • Data ownership, use, and access by third parties to patient-level, facility-level, or national-level findings.
  • Confidentiality – of patients, facilities, and countries compliant: 1) with legal regional or requirements such as GDPR (European Union) or HIPAA (United States); and 2) agreements by network participants
• Differences between human and animal data – commercial aspects
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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<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>
<td>- Translate high-level objectives and strategies into implementation plans</td>
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<td>- Strengthen organizational structures and build capacity</td>
<td>- Detect and contain emerging resistant pathogens, including outbreaks, in real time</td>
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<td>- Establish coordination mechanisms and communication pathways</td>
<td>- Assess and update standard treatment guidelines in human and animal settings</td>
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<td>- Define public health priorities and resource needs according to disease burden</td>
<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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<tr>
<td>- Allocate sufficient financial and human resources</td>
<td>- Benchmark resistance findings and investigate outlying and unexpected findings</td>
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<tr>
<td>- Advance regulatory and legislative agenda for antimicrobial resistance containment</td>
<td>- Develop educational and advocacy materials targeted to healthcare workers, policy makers, food producers, and the general public</td>
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<tr>
<td>- Establish high-level objectives, strategies, and monitoring and evaluation metrics for program success</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
Data value and use issues

• Data granularity: national aggregate statistics, facility or region aggregate statistics, patient/isolate-level primary data
• Quality: In what ways might poor quality data impact conclusions and actions?
• Bias/representativeness – patient presentation, sampling, testing
  • The data are not “biased”. They represent “something” very well, but what is that “something”? And is it useful for decision-making?
  • The bias is introduced when generalizing conclusions to other scenarios of greater epidemiological interest and policymaking relevance
  • How may the biases adversely impact conclusions and actions?
  • Recognizing data biases, what can we learn of relevance to decision-making and action?
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 African context
The CGIAR AMR hub

The CGIAR Antimicrobial Resistance Hub, led by the International Livestock Research Institute (ILRI), applies a One Health approach to support the efforts of low- and middle-income countries (LMICs) in controlling agriculture-associated AMR risks, through promoting and facilitating transdisciplinary partnerships.

The data warehouse

The WAHO regional data warehouse

30 June 2021
Governance framework

• African Union, Africa CDC: AMR Framework, AMRSNET

• Regional Economic Communities recognized by the African Union
  • Arab Maghreb Union (UMA), Common Market for Eastern and Southern Africa (COMESA), Community of Sahel-Saharan States (CEN-SAD), East African Community (EAC) and the East Africa Public Health Laboratory Network (EAPHL), Economic Community of Central African States (ECCAS), Economic Community of West Africa (ECOWAS), Intergovernmental Authority on Development (IGAD), Southern African Development Community (SADC)

• Other governmental and nongovernmental organizations
  • West African Health Organization (WAHO) with WAHIT and the Regional Disease Surveillance Systems Enhancement (REDISSE), East, Central and Southern African Health Community (ECSA-HC)
  • Arab League, Indian Ocean Commission (IOC), Economic and Monetary Union of Central Africa (EMUCA), Southern African Customs Union (SADU)
  • Réseau d’Afrique de l’Ouest des laboratoires de biologie médicale (RESAOLAB)
  • Connecting Organizations for Regional Disease Surveillance (CORDS)
  • ReACT Africa
  • African Association for Research and Control of AMR
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
  • Some from the bottom up, some from the top down – but regional and subregional approaches are key

• Framework for regional data collection, analysis, and interpretation
  • Based in governmental and intergovernmental structures
  • 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
Dòoni dòoni... kononi b’a nyaga da
  – Bambara saying, Mali

Petit à petit... l’oiseau fait son nid

Little by little... the bird makes its nest!