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
One Health view of antimicrobials and resistance

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

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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
• Capacity-building: National strengthening and standardization of approaches

Value of national benchmarking, best practices, lessons learned, and relevant regional models
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/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
• Ongoing versus periodic versus snapshot information needs
• Aggregate statistics versus patient- or isolate-level reporting
• Potential 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
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
Establishing a regional data sharing framework

- Regionalization of national initiatives
- Regionalization of global initiatives
Regionalization of national initiatives

• Approach taken by other WHO regions
  • Latin America ReLAVRA (AMR)
  • Europe: EARS-Net (AMR), CAESAR (AMR), ESAC-Net (AMC), HAI-Net (HAI)
  • Western Pacific: WPRACSS (AMC)
  • Africa: AMRSNET (AMR, AMC - Proposed)
  • FAO Region of Asia and the Pacific

• For WHO SEAR, with 11 Member States, this is realistic:
  • Long-standing (from 5 to 30+ years) national or subnational AMR surveillance programs in most WHO SEAR Member States
  • Current Fleming Fund Country, Fellow, and Regional Grant funds to establish or strengthen AMR and AMC programs in 8 Member States
  • Of 11 WHO SEAR Member States, 10 currently have national or subnational AMR and AMC surveillance activities
Regionalization of global initiatives

- United Nations (UN)
- World Health Organization (WHO)
- Food and Agricultural Organization (FAO)
- World Organisation for Animal Health (OIE)
- United Nations Development Programme (UNDP)
- United Nations Environment Program (UNEP)

Direct links between global and national authorities may be less successful, less sustainable, and less impactful than those coordinated through a regional approach
United Nations

• 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

- Pathogen- or subject-specific programs
  - AGISAR (Advisory Group for Integrated Surveillance of Antimicrobial Resistance)
  - Global Foodborne Infections Network (GFN)
  - ESBL *E. coli* TriCycle
  - 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 Technical Working Group on AMR Data Management
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 Development Programme

Antimicrobial resistance; an emerging crisis

Antimicrobial Resistance Multi-Partner Trust Fund
Combatting the rising global threat of AMR through a One Health Approach
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

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.

Image source: https://www.unep.org
IT approaches to support regional surveillance

- Region-specific software development
  - TESSy for EARS-Net, ESAC-Net, HAI-Net
  - RIVM CAESAR database for CAESAR
  - PLISA for ReLAVRA
  - WPRO IT platform for WPRACSS

- Regionalization of global platforms
  - WHO GLASS
  - FAO
  - OIE-WAHIS
  - FAO/OIE/WHO Tripartite
    - TISSA - Tripartite Integrated Surveillance System on AMR and AMU
Regionalization of global surveillance protocols and IT platforms

• 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
  • Specimen types, pathogens, antimicrobials, animal species and surveillance contexts to reflect local consensus agreements and priorities
  • Data analysis, reporting, and map and dashboard visualization features customized to specific stakeholder needs
  • Possibility of automated data management, notifications, and reports to facilitate real-time program monitoring, investigations, and response
  • Additional data sources relevant for that region
Data ownership and data use agreements

• 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
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?
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### Strategic versus technical policymaking

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| - Advocacy - resistance is major public health threat, heterogeneous issues, and worsening  
- Strengthen organizational structures and build capacity  
- Establish coordination mechanisms and communication pathways  
- Define public health priorities and resource needs according to disease burden  
- Allocate sufficient financial and human resources  
- Advance regulatory and legislative agenda for antimicrobial resistance containment  
- Establish high-level objectives, strategies, and monitoring and evaluation metrics for program success | - Translate high-level objectives and strategies into implementation plans  
- Detect and contain emerging resistant pathogens, including outbreaks, in real time  
- Assess and update standard treatment guidelines in human and animal settings  
- Benchmark antimicrobial use, infection control, and laboratory test practices across healthcare facilities and communities with investigation and guidance on improvements  
- Benchmark resistance findings and investigate outlying and unexpected findings  
- Develop educational and advocacy materials targeted to healthcare workers, policy makers, food producers, and the general public |
Action priority 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:
  • The data are not “biased”. They represent “something” very well.
  • 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-marking 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
Conclusions

• Framework for regional data collection, analysis, and interpretation
  • Based in existing and new governmental and intergovernmental initiatives led by WHO, FAO, OIE, ECDC, and Africa CDC
  • Data collection should include routine AMR and AMC surveillance data, but also information on structures, capacities, activities, and directions
  • Regional customization of global protocols and IT strategies would facilitate global consistency of core modules and strategies across regions, but also incorporate regional priorities and consensus agreements supporting regional relevance, ownership, sustainability, and ties to action.

• Framework for translating data to action
  • Action for improving capacity and action for resistance containment
  • This should be based on results from the regional data collection framework as well as other relevant information resources.
  • There should be a broad coalition of governmental, nongovernmental, industry, and civil society partners to translate data findings into resistance containment action in advocacy/awareness, disease prevention, improved antimicrobial use, and decreased transmission