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

Fleming Fund RADAAR Project

The Fleming Fund Regional Grants

14 July 2021

John Stelling

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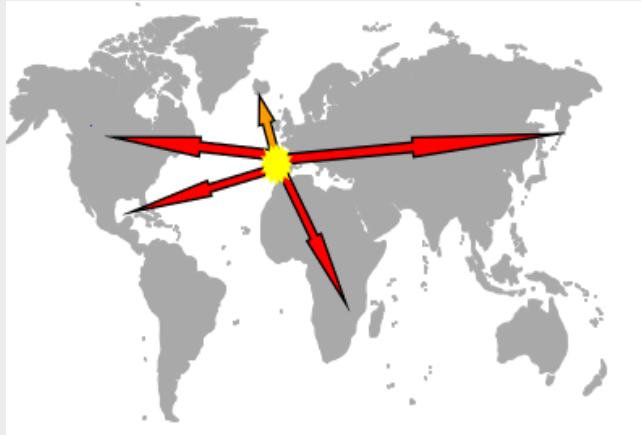
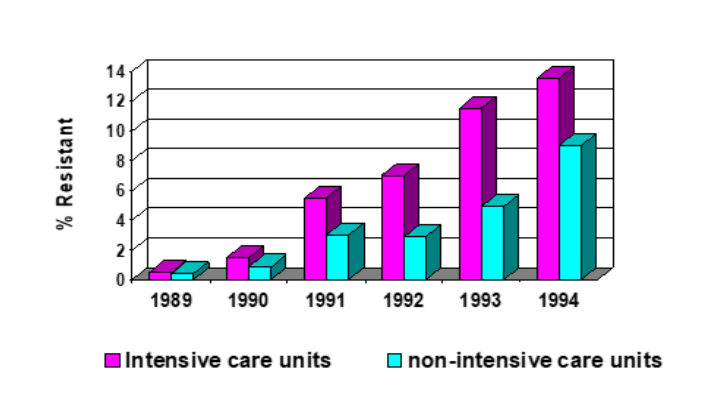
Emergence of antimicrobial resistance

Appearance

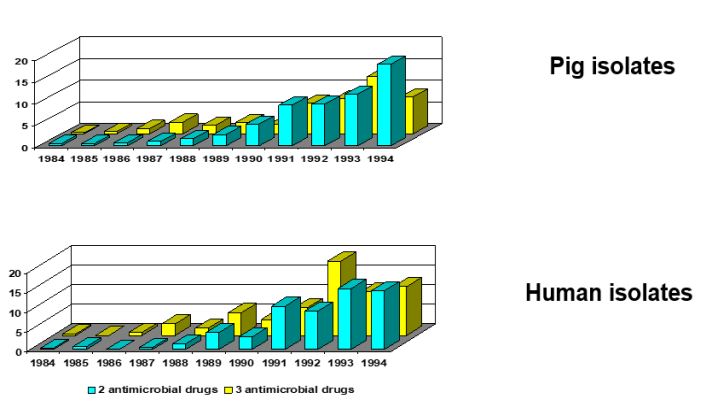
Dissemination



Establishment



Transfer between sectors



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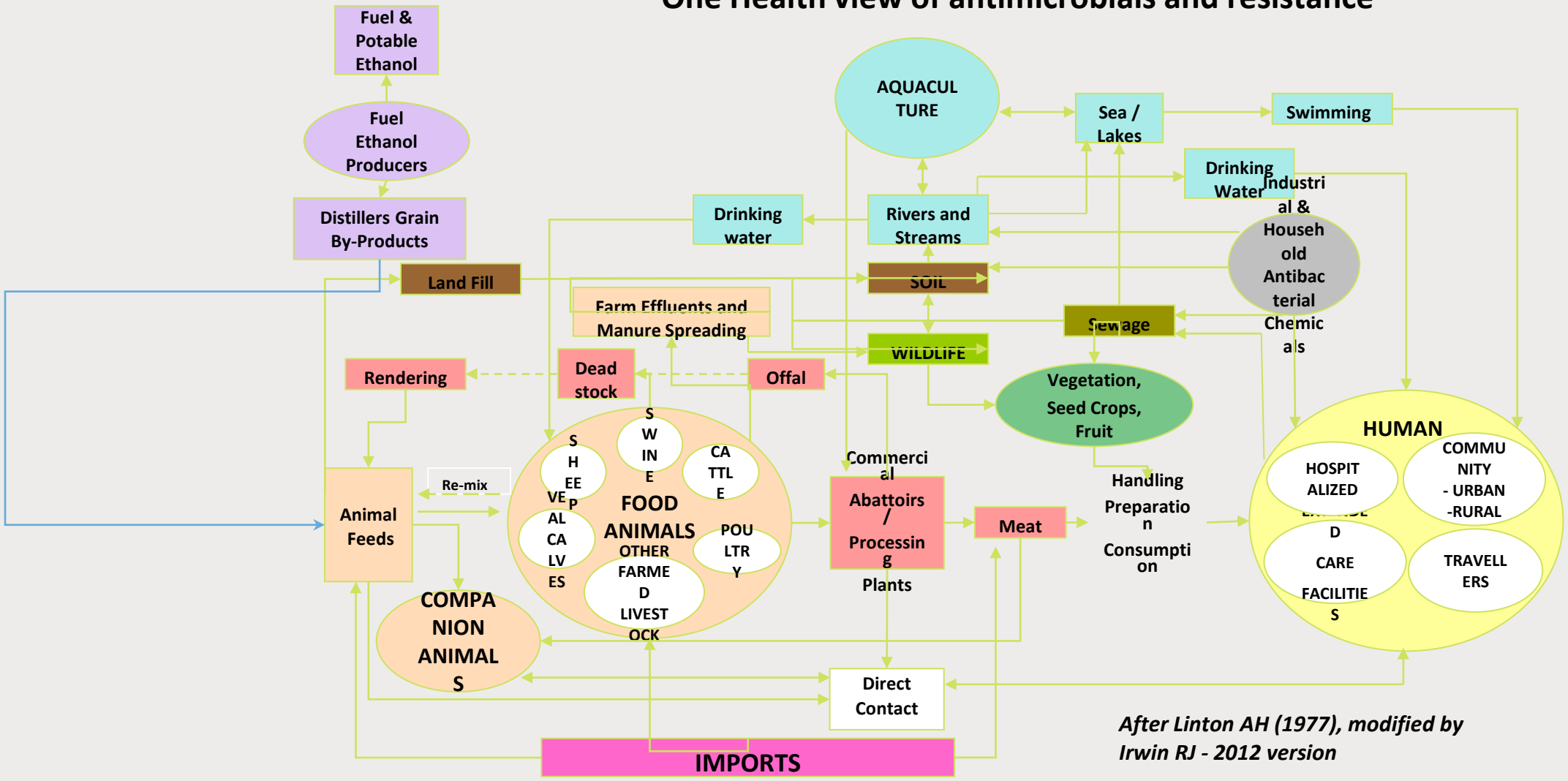
One Health view of antimicrobials and resistance



After Linton AH (1977), modified by Irwin RJ - 2012 version

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AMR Surveillance objectives

Objectives	Local	National	Regional	Global
Policy and advocacy				
Priority setting and funding	X	X	X	X
Awareness and education	X	X	X	X
Legislation and regulation			X	X
Epidemiology of resistant microbes				
Pathogen and resistance trends	X	X	X	X
Recognition of emerging threats	X	X	X	X
Disease burden	X	X	X	X
Benchmarking		X	X	X
Resistance containment				
Treatment guidelines	X	X		
Response to emerging threats	X	X	X	X
Assessment of interventions	X	X	X	X
New diagnostics and therapeutics			X	X
Capacity-building				
Laborotory capacity	X	X	X	X
Epidemiological capaciy	X	X	X	X

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Current global initiatives

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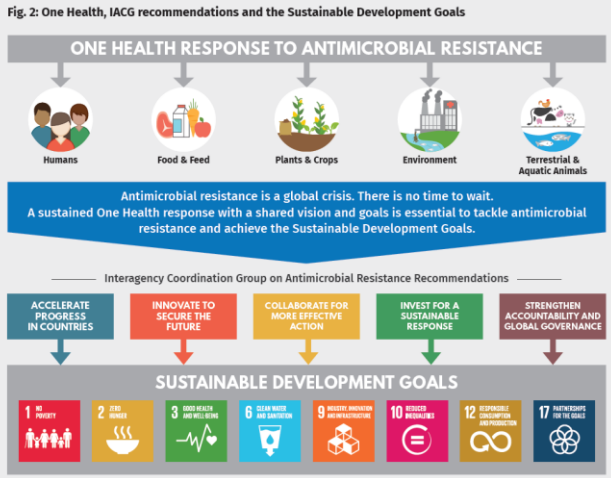
United Nations

- 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



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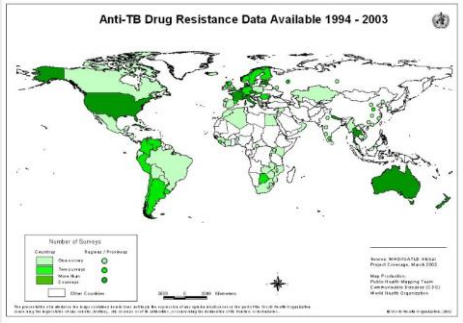
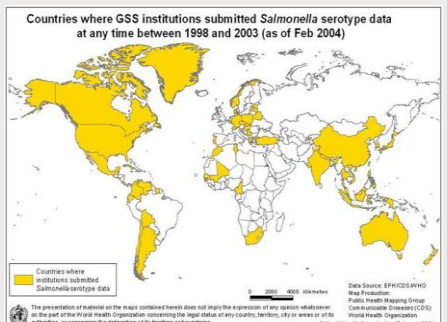
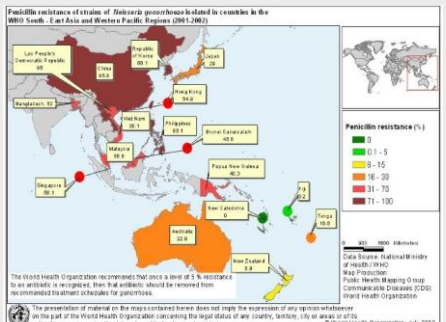
World Health Organization

- 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







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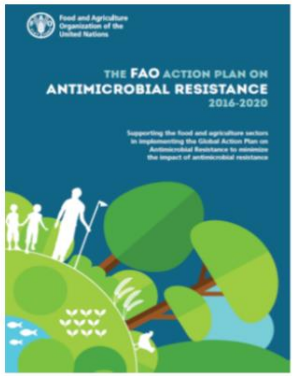
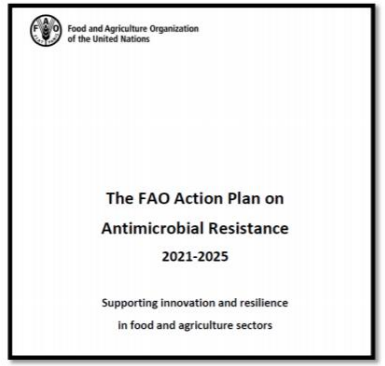
Food and Agriculture Organization of the UN

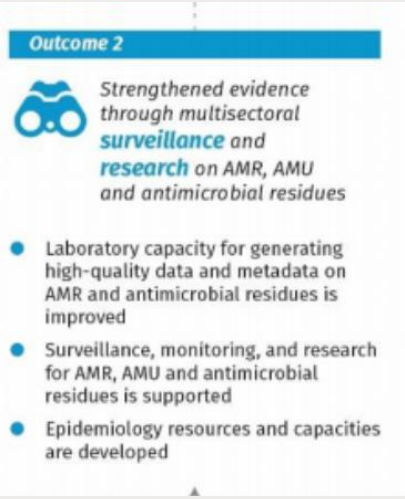
- FAO AMR Surveillance guidelines
  - Published: AMR in healthy animals
  - Advanced draft: AMR in diseased animals and in aquiculture
  - In development: AMR in animal environment and Antimicrobial use
- FAO-ATLASS: FAO Assessment Tool for Laboratories and AMR Surveillance Systems
- FAO-PMP-AMR: FAO Progressive Management Pathway for AMR
- FAO Technical Working Group on AMR Data Management

The FAO Action Plan on AMR 2016-2020



Draft proposal for the Action Plan on AMR 2021-2025





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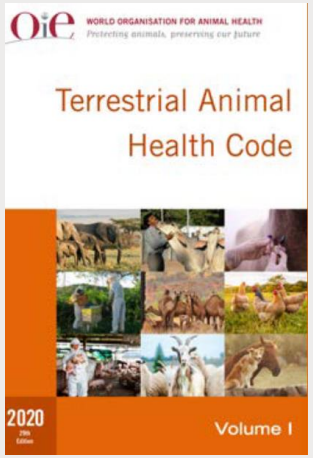
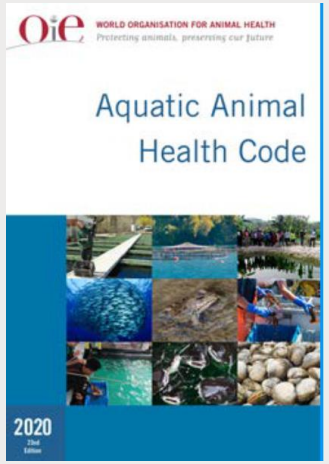
World Organisation for Animal Health



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

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United Nations Environment Programme

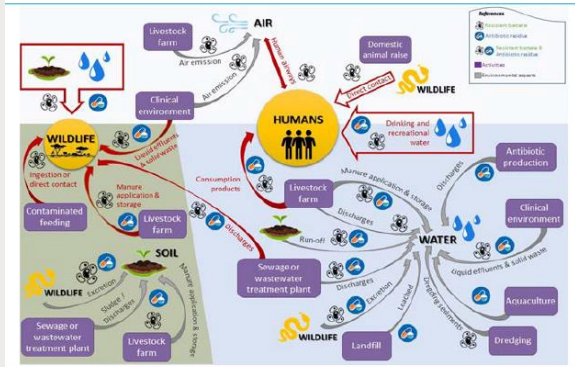
UN environment programme

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

UN environment programme

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.

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United Nations Development Programme

ENGLISH WHO WE ARE WHAT WE DO UNDP OUR IMPACT

HOME / BLOG / ANTIMICROBIAL RESISTANCE; AN EMERGING CRISIS

Antimicrobial resistance; an emerging crisis

ISSUE BRIEF

United Nations Development Programme

UNDP

Empowered lives.
Resilient nations.

MULTI-SECTORAL RESPONSES TO ANTIMICROBIAL RESISTANCE

Antimicrobial Resistance Multi-Partner Trust Fund

Combatting the rising global threat of AMR through a One Health Approach

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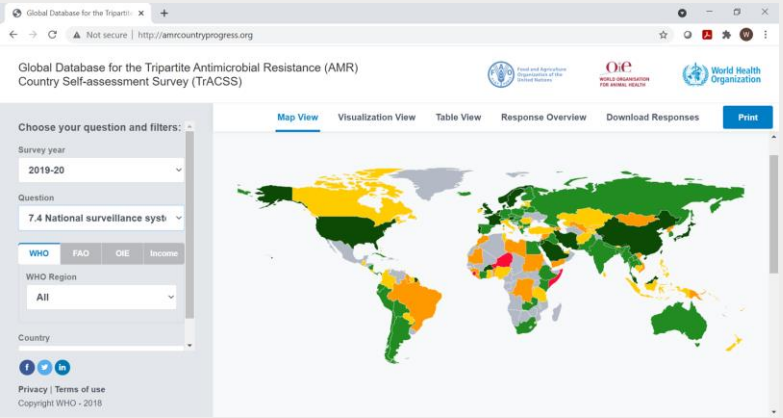
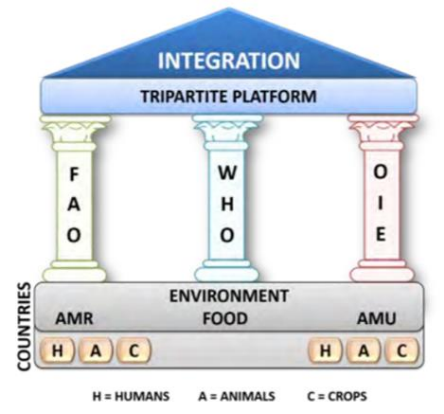
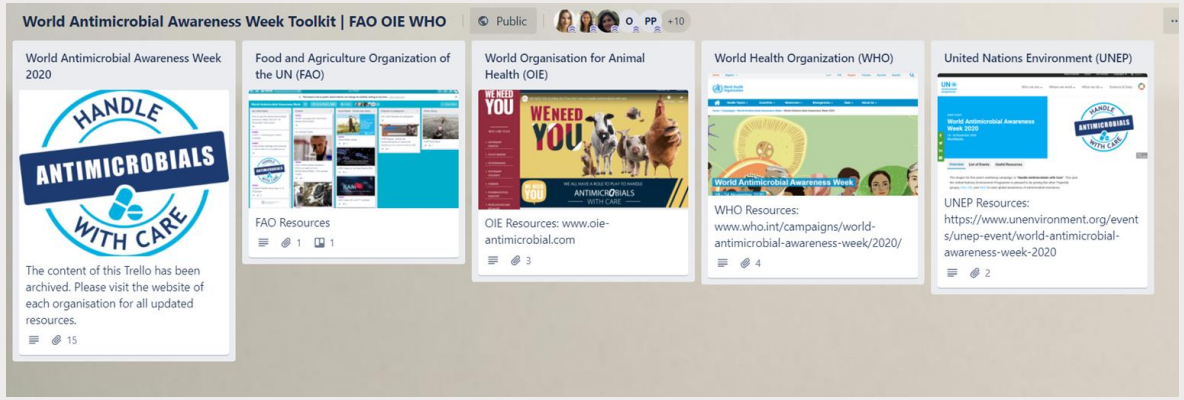
FAO-OIE-WHO Tripartite collaborations

- TrACCs: Tripartite AMR Country Self-assessment Survey, http://amrcountryprogress.org
- TISSA: Tripartite Integrated Surveillance System on AMR and AMU
- World Antimicrobial Awareness Week coordinated messages and activities







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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

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Framework for regional data collection, sharing, and analysis

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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.*

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Antimicrobial resistance surveillance models

- Alert organism surveillance
- Enhanced routine surveillance
- Targeted surveillance protocols and surveys

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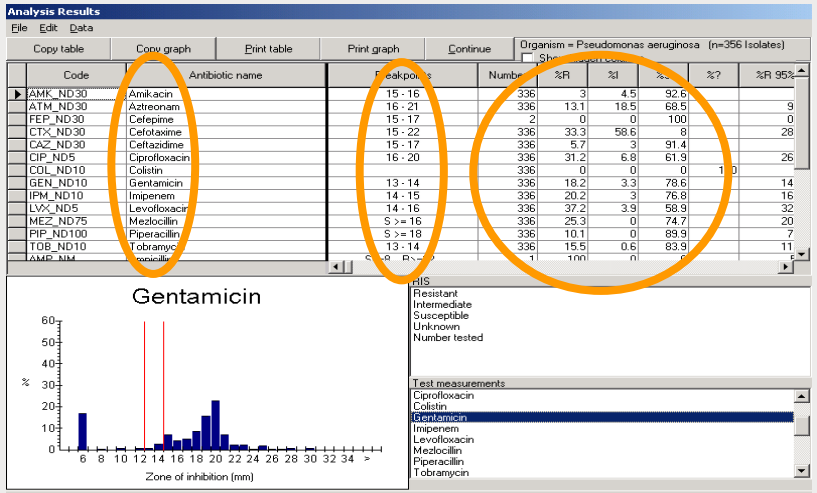
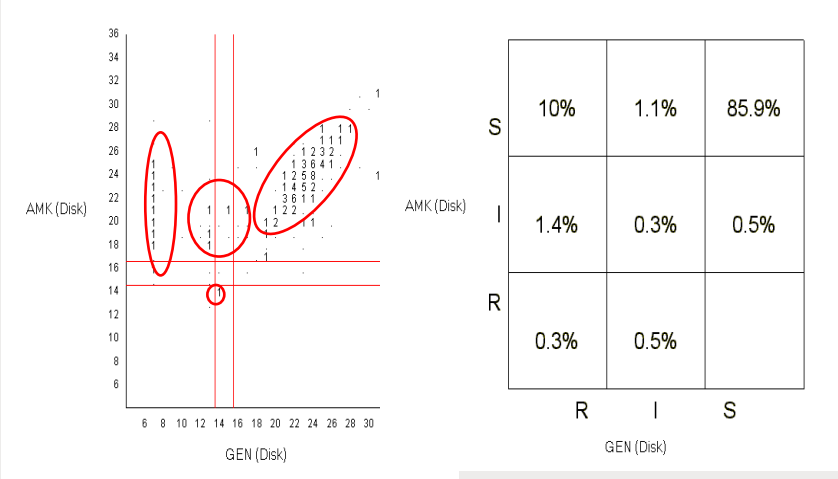
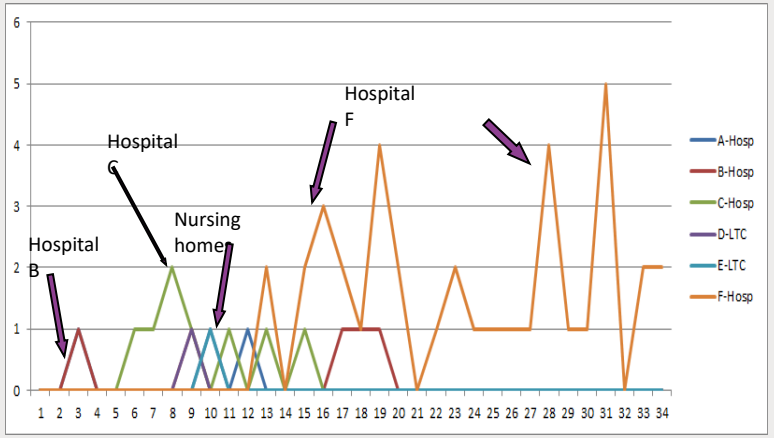
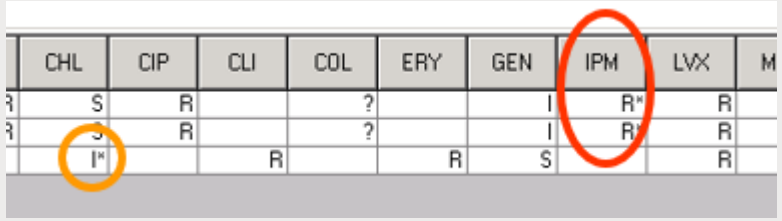
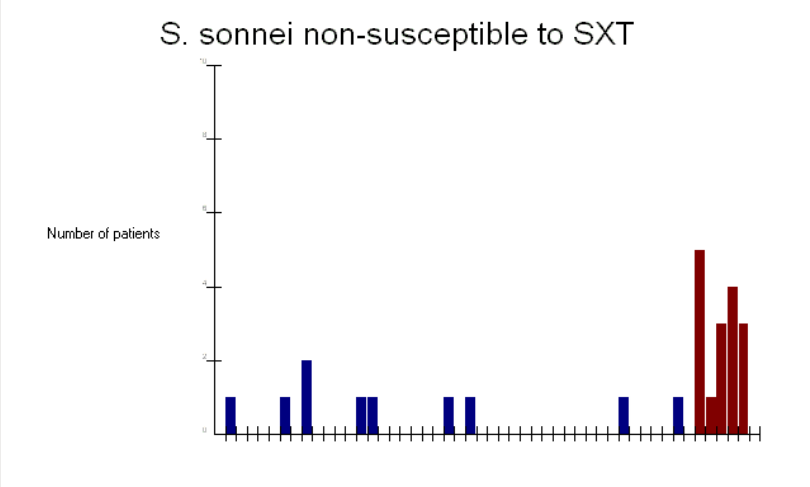
WHONET analysis, alert, and report features











GLASS
Global AMR Surveillance System

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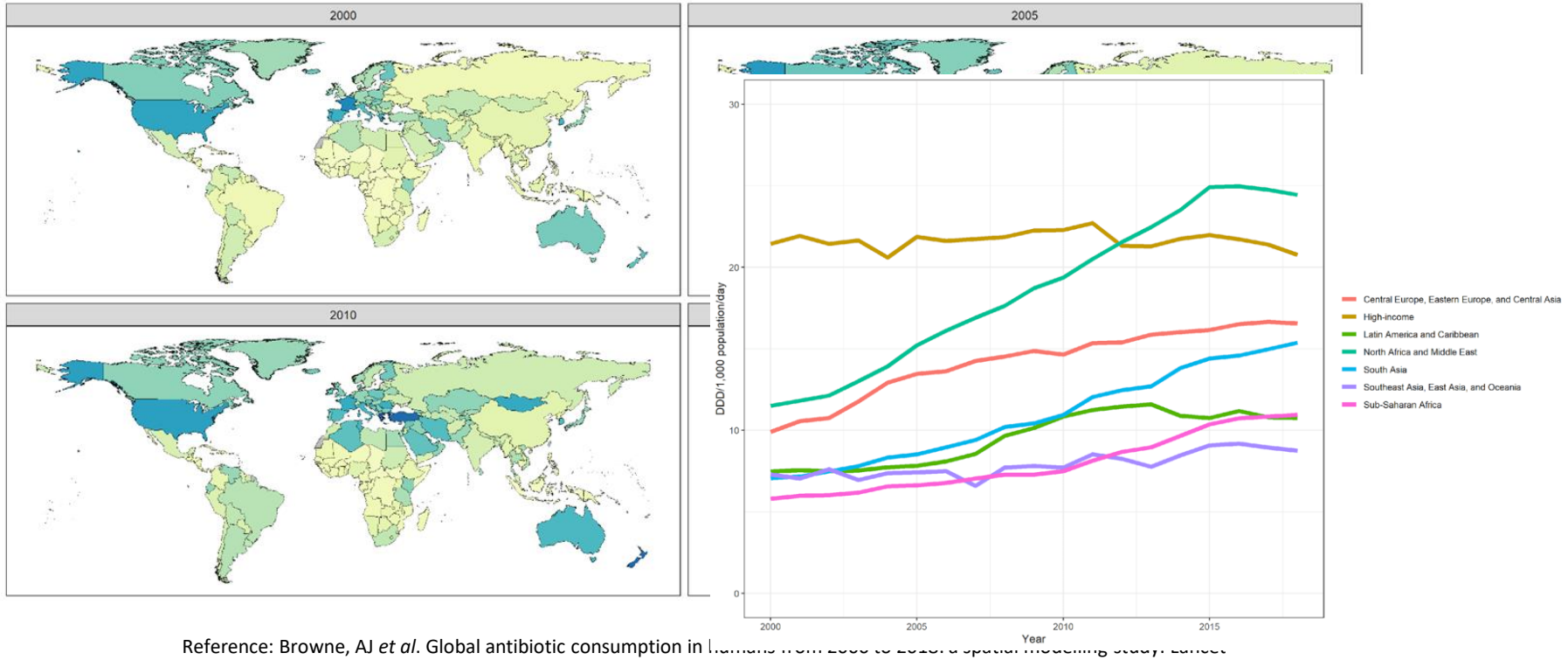
Antimicrobial use surveillance models

- Aggregate facility or national statistics – “Antimicrobial Consumption”
- Patient-level “Antimicrobial Use”
- Metrics:
  - Quantitative
  - Qualitative

Global antibiotic consumption rates: time series 2000-2015



Reference: Browne, AJ *et al*. Global antibiotic consumption in humans from 2000 to 2015: a spatial modelling study. Lancet Planetary Health (under review).

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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

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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

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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

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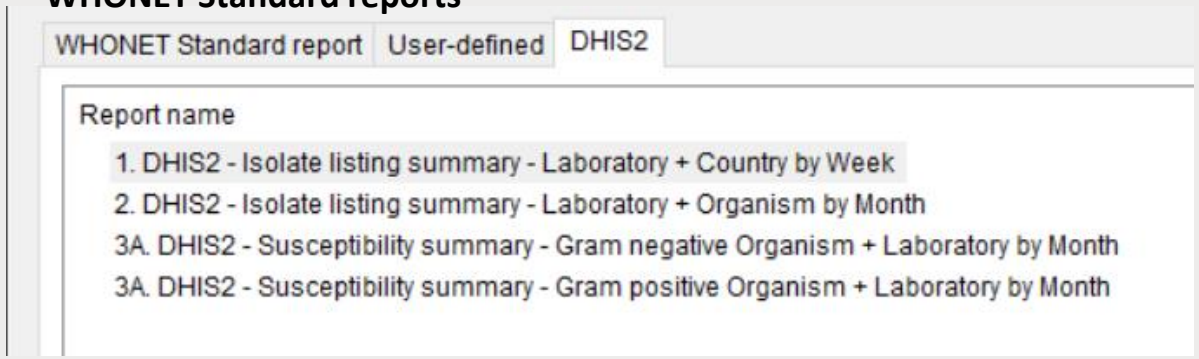
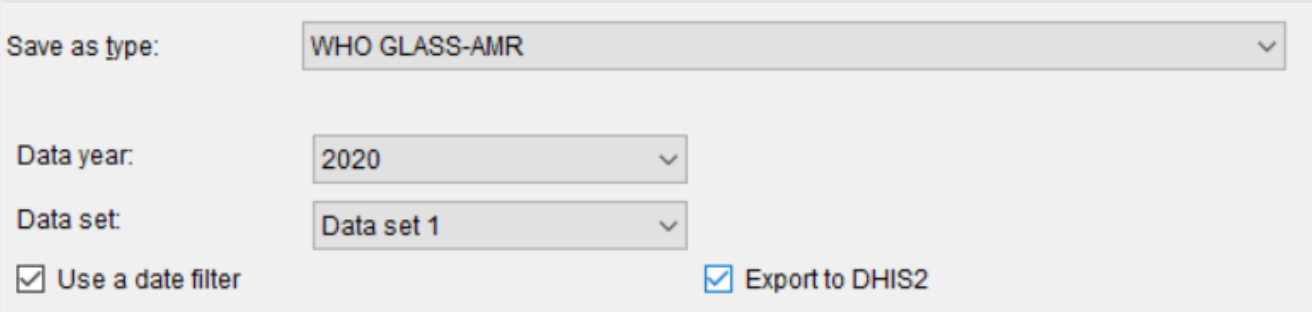
Importing WHONET results to DHIS2

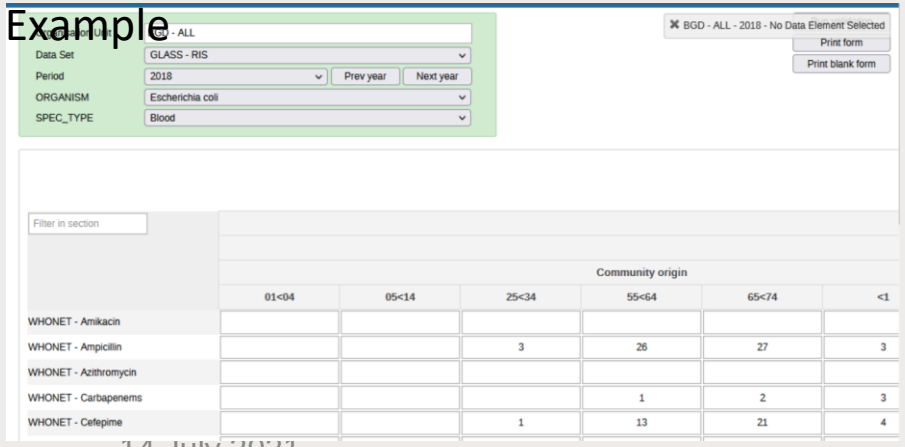
WHONET Standard reports



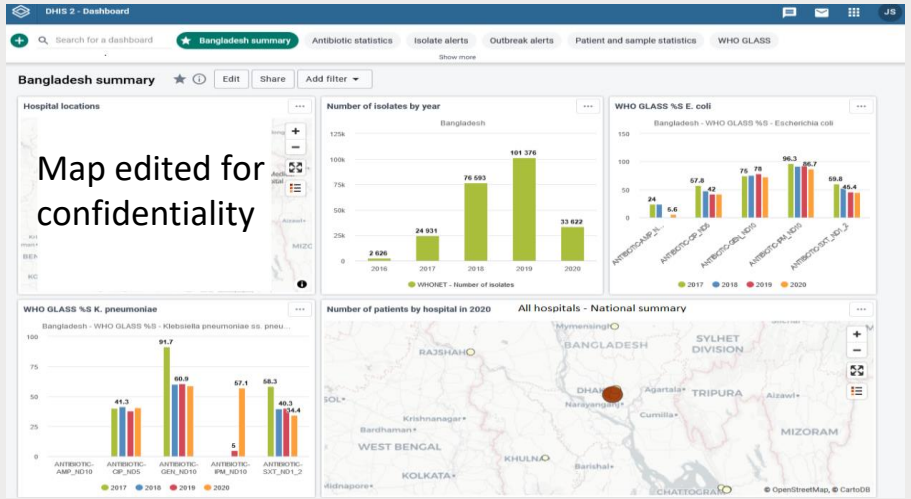
WHO GLASS Export



Display of Data Set and Events – WHO GLASS Example



Dashboard display



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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

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Framework for translating data into action

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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

Strategic policymakers	Technical policymakers
· 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

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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

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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

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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

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AMR Containment in the Asian context

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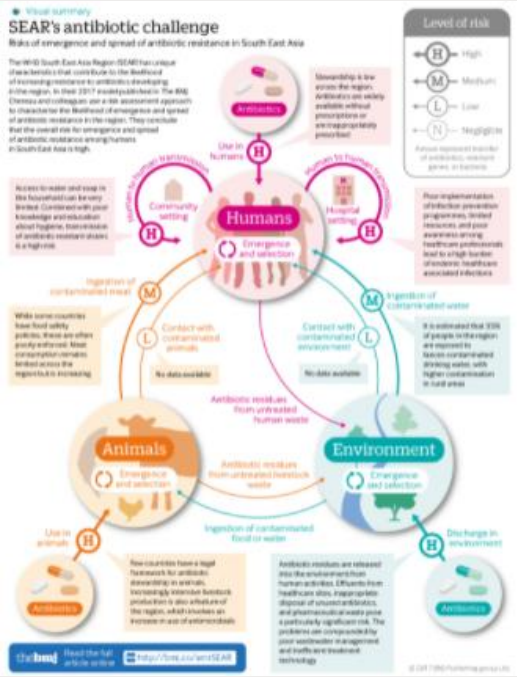

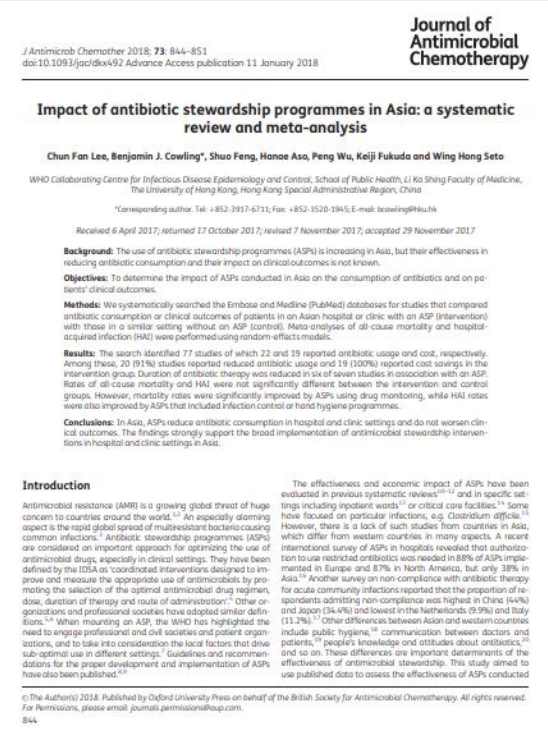
J Antimicrob Chemother 2018; 73: 844–851
doi:10.1093/jac/dkx492 Advance Access publication 11 January 2018
Journal of Antimicrobial Chemotherapy

Impact of antibiotic stewardship programmes in Asia: a systematic review and meta-analysis

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Received 6 April 2017; returned 17 October 2017; revised 7 November 2017; accepted 29 November 2017

Background: The use of antibiotic stewardship programmes (ASPs) is increasing in Asia, but their effectiveness in reducing antibiotic consumption and their impact on clinical outcomes is not known.

Objectives: To determine the impact of ASPs conducted in Asia on the consumption of antibiotics and on patients' clinical outcomes.

Methods: We systematically searched the Embase and Medline (PubMed) databases for studies that compared antibiotic consumption or clinical outcomes of patients in an Asian hospital or clinic with an ASP (intervention) with those in a similar setting without an ASP (control). Meta-analyses of all-cause mortality and hospital-acquired infection (HAI) were performed using random-effects models.

Results: The search identified 77 studies of which 22 and 19 reported antibiotic usage and cost, respectively. Among these, 20 (91%) studies reported reduced antibiotic usage and 19 (100%) reported cost savings in the intervention group. Duration of antibiotic therapy was reduced in six of seven studies in association with an ASP. Rates of all-cause mortality and HAI were not significantly different between the intervention and control groups. However, mortality rates were significantly improved by ASPs using drug monitoring, while HAI rates were also improved by ASPs that included infection control or hand hygiene programmes.

Conclusions: In Asia, ASPs reduce antibiotic consumption in hospital and clinic settings and do not worsen clinical outcomes. The findings strongly support the broad implementation of antimicrobial stewardship interventions in hospital and clinic settings in Asia.

Introduction

Antimicrobial resistance (AMR) is a growing global threat of huge concern to countries around the world.[1,2] An especially alarming aspect is the rapid global spread of multiresistant bacteria causing common infections.[3] Antibiotic stewardship programmes (ASPs) are considered an important approach for optimizing the use of antimicrobial drugs, especially in clinical settings. They have been defined by the IDSA as 'coordinated interventions designed to improve and measure the appropriate use of antimicrobials by promoting the selection of the optimal antimicrobial drug regimen, dose, duration of therapy and route of administration'.[4] Other organizations and professional societies have adopted similar definitions.[5,6] When mounting an ASP, the WHO has highlighted the need to engage professional and civil societies and patient organizations, and to take into consideration the local factors that drive sub-optimal use in different settings.[7] Guidelines and recommendations for the proper development and implementation of ASPs have also been published.[8,9]

The effectiveness and economic impact of ASPs have been evaluated in previous systematic reviews[10–12] and in specific settings including inpatient wards[13] or critical care facilities.[14] Some have focused on particular infections, e.g. Clostridium difficile.[15] However, there is a lack of such studies from countries in Asia, which differ from western countries in many aspects. A recent international survey of ASPs in hospitals revealed that authorization to use restricted antibiotics was needed in 88% of ASPs implemented in Europe and 87% in North America, but only 38% in Asia.[16] Another survey on non-compliance with antibiotic therapy for acute community infections reported that the proportion of respondents admitting non-compliance was highest in China (44%) and Japan (34.4%) and lowest in the Netherlands (9.9%) and Italy (11.2%).[17] Other differences between Asian and western countries include public hygiene,[18] communication between doctors and patients,[19] people's knowledge and attitudes about antibiotics,[20] and so on. These differences are important determinants of the effectiveness of antimicrobial stewardship. This study aimed to use published data to assess the effectiveness of ASPs conducted


Yam et al. Antimicrobial Resistance and Infection Control (2019) 8:202
https://doi.org/10.1186/s13756-019-0654-8
Antimicrobial Resistance and Infection Control
MEETING REPORT
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Antimicrobial Resistance in the Asia Pacific region: a meeting report

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Abstract

The Asia Pacific region, home to two-thirds of the world's population and ten of the least developed countries, is considered a regional hot-spot for the emergence and spread of antimicrobial resistance (AMR). Despite this, there is a dearth of high-quality regional data on the extent of AMR. Recognising the urgency to close this gap, Singapore organised a meeting to discuss the problems in the region and frame a call for action. Representatives from across the region and beyond attended the meeting on the "Antimicrobial Resistance in the Asia Pacific & its impact on

Developing a situation analysis tool to assess containment of antimicrobial resistance in South East Asia

Manish Kakkar and colleagues discuss the development of a tool to assess how programmes tackling antimicrobial resistance in South East Asia are faring

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Disease dynamics

Hub researchers are assessing how pathogens and genes can transmit between chickens and from chickens to people and back again - focusing in particular on how this is influenced by how chickens are kept and traded. This is vital information to inform potential interventions.

APCCMI SINGAPORE 2021

18TH ASIA PACIFIC CONGRESS OF CLINICAL MICROBIOLOGY AND INFECTION

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Antimicrobial stewardship capacity and manpower needs in the Asia Pacific

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The Fleming Fund
Regional Grants

Governance framework

- ASEAN
  - Regional Strategy on AMR Communication and Advocacy
  - ASEAN Leaders' Declaration on AMR
- SAARC
  - AMR Technical Advisory Group of the South Asian Associat
- 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)

ASEAN Leaders' Declaration on Antimicrobial Resistance (AMR): Combating AMR through One Health Approach

1. WE, the Heads of State and Government of the Member States of the Association of Southeast Asian Nations (ASEAN), namely Brunei Darussalam, the Kingdom of Cambodia, the Republic of Indonesia, the Lao People's Democratic Republic, Malaysia, the Republic of the Union of Myanmar, the Republic of the Philippines, the Republic of Singapore, the Kingdom of Thailand, and the Socialist Republic of Viet Nam, on the occasion of the 31st ASEAN Summit in Manila, Philippines on 13 November 2017, have come together to jointly cooperate in combating antimicrobial resistance (AMR) through a multisectoral and multidisciplinary approach within the framework of "One Health";

Adopted 39th AMAF Meeting (28/9/2017)

ASEAN REGIONAL STRATEGY ON ANTI MICROBIAL RESISTANCE COMMUNICATION AND ADVOCACY

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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