

*Sameeksha** – Antimicrobial Resistance (AMR)

* *Sameeksha* is a Hindi word, meaning review. This compilation of publications and resources (along with a brief summary) aims to review and share information to facilitate containment of antimicrobial resistance in India, grouped according to the strategic priorities of India's National Action Plan on Antimicrobial Resistance. Kindly note, inclusion of publications and resources in this review/compilation does not imply an endorsement by WHO.

Key highlights of volume 8

- Resistance to antibiotics and antimicrobials: mechanisms and new strategies to fight resistant bacteria
- Antimicrobial susceptibility testing: a comprehensive review of currently used methods
- Implementation of hand hygiene in health-care facilities: global survey 2019
- Interventions to improve dispensing of antibiotics at the community level in LMICs
- Targeting multidrug resistance with antimicrobial peptide-decorated nanoparticles and polymers
- Indian State Action Plans on AMR in focus at stakeholder colloquium

Strategic priority 1: Awareness and understanding

Antibiotics and antimicrobials resistance: mechanisms and new strategies to fight resistant bacteria

- Apart from identifying strategies that can work to reduce the burden of bacterial antibiotic resistance, combating AMR also needs collective action, multisectoral collaboration and partnerships.

Antibiotics | Editorial | 17 March 2022 | [Online link](#)

Surgical site infections (SSI)

- Covers SSI rates and global burden, risk factors for SSI, prevention measures to reduce SSI, and adaptive and technical approaches to improve and apply WHO multimodal strategy.
- Describes the interconnection between SSI prevention and overall IPC efforts and how SSI prevention should be a critical part of a strong, effective IPC programme.

OpenWHO | e-Course | [Online link](#)

Antimicrobial stewardship programmes in health-care facilities in low-and middle-income countries: a WHO practical toolkit

- Provides practical guidance to support implementation of optimizing the use of antimicrobial medicines.
- Explains the fundamentals of antimicrobial stewardship (AMS), structures for health-care facility AMS program, develop and plan AMSP in HCF, perform AMS interventions in HCF, assess an AMS programme, identify the education and training required to develop key AMS competencies, etc.

OpenWHO | e-Course | [Online link](#)

WHO policy guidance on integrated antimicrobial stewardship (AMS) activities

- Covers key aspects of AMS policy guidance, interpret the package of integrated AMS activities, identify important considerations for a successful implementation of integrated AMS activities, illustrate use of periodic national assessment tool, etc.

OpenWHO | e-Course | [Online link](#)

Understanding antimicrobial resistance (AMR) in food and agriculture

- Explains the role of the food and agriculture sector, and the impact of AMR on agri-food systems.
- Designed for stakeholders including producers and wholesale and retail distributors of antimicrobials, veterinary services, epidemiologists, laboratory personnel and academia including students, government officials, policy makers, food safety officers and private sector.

FAO | e-Course | March 2022 | [Online link](#)

Strategic priority 2: Laboratories and surveillance

Antimicrobial susceptibility testing: a comprehensive review of currently used methods

- Molecular-based methods are rapid, efficient, and reliable, with high specificity and sensitivity.
- MALDI-TOF MS is a promising highly specific system with reduced time and low cost of consumables but is not yet validated for all species and antimicrobials, with high initial and maintenance costs.

Antibiotics | Review | 23 March 2022 | [Online link](#)

Guidance on diagnosis & management of carbapenem resistant Gram-negative infections

- Outlines the diagnosis of carbapenem resistance using phenotypic and commercial assays.
- Recommendations on clinical management include guidance on empiric therapy, directed therapy, and carbapenem resistant non-Enterobacterales.

ICMR | Guidance | March 2022 | [Online link](#)

Increasing antimicrobial resistance in World Health Organization Eastern Mediterranean Region (EMR), 2017–2019

- Analysed data on bloodstream infections reported to the Global Antimicrobial Resistance Surveillance System (GLASS) during 2017–2019, data from 7 countries on nationally representative surveys of antimicrobial prescriptions, and data from 2 regional surveys.
- High prevalence of AMR and limited capacity for response needs regional political leadership to address AMR in the Eastern Mediterranean Region.

Emerging Infectious Diseases | Synopsis | April 2022 | [Online link](#)

The European Union summary report on antimicrobial resistance in zoonotic and indicator bacteria from humans, animals and food in 2019–2020

- Provides an overview of the main findings of the 2019–2020 harmonised AMR monitoring in main food-producing animal populations monitored, in carcase/meat samples and in humans.

European Food Safety Authority | Scientific report | 12 April 2022 | [Online link](#)

Prevalence and trends in antimicrobial susceptibility patterns of multi-drug-resistance non-typhoidal *Salmonella* in Central Thailand, 2012–2019

- Retrospective study of 433 patients who had non-typhoidal *Salmonella* (NTS) infection, from 10 hospitals between June 2011 and June 2020 whose analysis included demographic data, culture reports and AST.
- Prevalence of MDR-NTS is rising, especially in resistance to ceftriaxone and ciprofloxacin, first drug group used for treatment.

Infection and Drug Resistance | Original research | 29 March 2022 | [Online link](#)

Feasibility, challenges, and benefits of global antimicrobial resistance surveillance system implementation: results from a multicenter quasi-experimental study

- Analyses the data on the types of bacteria isolated and their antibiotic susceptibility in three provincial hospitals in Thailand, to determine the feasibility and benefits of GLASS as a component of antimicrobial stewardship strategies.

Antibiotics | Article | 6 March 2022 | [Online link](#)

Strategic priority 3: Infection prevention and control

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

- The HHSAF score out of 3206 unique responses from 90 countries (46% WHO Member States) indicated an intermediate hand hygiene implementation level (350 points, IQR 248–430), which was positively associated with country income level and health-care facility funding structure.
- 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.

The Lancet (Infectious Diseases) | Article | 21 February 2022 | [Online link](#)

Hand hygiene compliance and its drivers in long-term care facilities; observations and a survey

- 496 professionals in 14 long-term care facilities were observed using WHO's 'five moments of hand hygiene' observation tool and in addition, a survey was conducted to examine determinants that may influence hand hygiene and to determine differences between different cadres of staff.
- Overall hand hygiene compliance was low, with substantial variation between wards and different cadres of staff.

Antimicrobial Resistance & Infection Control | Review | 18 March 2022 | [Online link](#)

Are there reasons behind high hand rub consumption? A French national in-depth qualitative assessment

- Aims to describe programmes for promoting hand hygiene in the top and medium alcohol-based handrub consumption (AHRC) scorers and to assess factors and drivers leading to a high AHRC score.
- Highlights the importance of a strong cohesive structure of the IPC team and the behavioural approaches in implementing key IPC programmes.

Antimicrobial Resistance & Infection Control | Research | 23 February 2022 | [Online link](#)

Impact of environmental hygiene interventions on healthcare-associated infections and patient colonization: a systematic review

- Reviews the effect of healthcare environmental hygiene interventions on HAI or patient colonization.
- Demonstrates a strong relation between interventions to improve healthcare environmental hygiene and a reduction in both environmental bioburden and in patient colonization or HAI.

Antimicrobial Resistance & Infection Control | Review | 19 February 2022 | [Online link](#)

Three-year evaluation of the nosocomial infections in pediatrics: bacterial and fungal profile and antimicrobial resistance pattern

- 718 patients were found with nosocomial infections, of which *Klebsiella pneumoniae* and *Candida* spp. isolates were most prevalent, followed by *Pseudomonas aeruginosa* and Coagulase-Negative Staphylococci.
- High levels of AMR to the commonly tested antibiotics needs effective infection control programs and rational antibiotic use.

Annals of Clinical Microbiology and Antimicrobials | Research | 16 February 2022 | [Online link](#)

Strategic priority 4: Optimise use of antimicrobials

Interventions to improve dispensing of antibiotics at the community level in low- and middle-income countries: a systematic review

- Documents the effectiveness of interventions to improve the dispensing of antibiotics by community health posts, over the counter medicine sellers and community pharmacies in LMIC.
- Highlights the importance of stakeholders' engagement in development and maximizing effectiveness of interventions to improve dispensing practices.

Journal of Global Antimicrobial Resistance | Systematic review | 25 March 2022 | [Online link](#)

Pandemic panic and indiscriminate prescriptions drive India's antimicrobial resistance

- Significant increase in antibiotic sales to adults was noted during the peak of second wave, especially azithromycin.

BMJ | Feature | 8 March 2022 | [Online link](#)

Reduction of unnecessary antibiotic days in a level IV neonatal intensive care unit

- Study aimed to reduce unnecessary antibiotic use in a level IV NICU by 20% within 1 year.
- Multidisciplinary antibiotic stewardship team coupled with a consensus for antibiotic therapy duration, prescriber justification of antibiotic necessity and use of antibiotic stop dates can effectively reduce unnecessary antibiotic exposure in the NICU.

Antimicrobial Stewardship & Healthcare Epidemiology | Article | 28 March 2022 | [Online link](#)

From OIE standards to responsible and prudent use of antimicrobials: supporting stewardship for the use of antimicrobial agents in animals

- The World Organisation for Animal Health (OIE)'s strategy on AMR and the prudent use of antimicrobials is aligned with Global Action Plan on AMR and recognizes the importance of a One Health approach.
- OIE supports its Members through standards and guidelines, antimicrobial stewardship tools and procedures for responsible and prudent use of antimicrobials for control of AMR.

JAC-Antimicrobial Resistance | Review | 18 March 2022 | [Online link](#)

One health: harmonizing infection prevention and control, and antimicrobial stewardship in combating antimicrobial resistance to improve patient safety

- AMR impacts patient safety by emergence, re-emergence and continued spread of multidrug resistant (MDR) pathogens.
- Committees responsible for patient safety regarding AMR, AMS and IPC should have a common platform under which the One Health concept can be practically utilized for maximum and long-lasting impact at all levels.

PAMJ One Health | Perspective | 11 March 2022 | [Online link](#)

Antibiotic use and outcomes in young children hospitalized with uncomplicated community acquired pneumonia

- Retrospective observational study of 322 healthy children, aged 3-36 months, hospitalized with uncomplicated community acquired pneumonia, of which 56 did not receive antibiotics.
- No difference was observed in outcome in previously healthy children <36 months of age, between those treated and not treated with antibiotics.

Open Forum Infectious Diseases | Major article | 9 March 2022 | [Online link](#)

Antimicrobial resistance in the EU/EEA – a One Health response

- Overall consumption of antibiotics in humans in the European Union/European Economic Area decreased by 23% between 2011 and 2020, however, relative use of broad-spectrum antibiotics has increased.
- Reducing the use of antibiotics in food-producing animals, replacing them where possible and rethinking the livestock production system in a One Health approach is essential for the future of animal and public health.

ECDC | Publication | 7 March 2022 | [Online link](#)

Antimicrobial stewardship and infection prevention and control in low- and middle-income countries: current status and best practices

- World Society of Pediatric Infectious Diseases (WSPID) proposes a modified declaration on combating AMR in children – that is more child focused, with emphasis on what must be done for pediatric populations in hospitals and clinics.

The Pediatric Infectious Disease Journal | Supplement | March 2022 | [Online link](#)

Strategic priority 5: Research, innovations, and finance

Targeting multidrug resistance with antimicrobial peptide-decorated nanoparticles and polymers

- Reviews the progress made in antimicrobial peptides (AMPs) – mechanism of action, classification, application status, design techniques, and nanoparticles and polymers with AMPs used in treating multidrug resistance.
- AMP-decorated nanoparticles and polymers can act as an additively enhanced combination therapeutic/delivery agent.

Frontiers in Microbiology | Review article | 31 March 2022 | [Online link](#)

A metagenomic assessment of gut microbiota in Indian colon cancer patients

- Studies gut microbiota in Indian healthy subjects and patients of colon cancer using 16S ribosomal RNA amplicon sequencing.

Journal of Cancer Research and Therapeutics | Original article | 30 March 2022 | [Online link](#)

Tackling the emerging threat of antifungal resistance to human health

- Reviews the mechanisms of antifungal resistance to explore similarities and differences between bacterial and fungal resistance for AMR control.
- Discusses the research and innovation topics needed for risk reduction strategies aimed at minimizing the emergence of resistance in pathogenic fungi.

Nature reviews microbiology | Review article | 29 March 2022 | [Online link](#)

JPIAMR strategic research and innovation agenda survey

- Current survey aimed at revising the five strategic priority topics of the Strategic Research and Innovation Agenda (SRIA) – 1) therapeutics, 2) diagnostics, 3) surveillance, 4) transmission and evolution, and 5) prevention and interventions.

Joint Programming Initiative on Antimicrobial Resistance | Survey | March 2022 | [Online link](#)

Phage banks as potential tools to rapidly and cost-effectively manage antimicrobial resistance in the developing world

- Centrally organized phage banks may provide cost-effective, local mechanisms through which developing countries can effectively respond to antibiotic-resistant outbreaks.

Current Opinion in Virology | Article | 15 February 2022 | [Online link](#)

Strategic priority 6: Collaborations

India: State Action Plans on AMR in focus at stakeholder colloquium

- Meeting to facilitate inter-state discussions on strategies to develop/implement State Action Plans on AMR with participation from 16 States and Union Territories, was jointly organized by ReAct Asia Pacific, World Animal Protection and WHO Country Office for India.
- A communique summarizing action points for States/UTs was developed to revitalize State Action Plans on AMR.

ReAct | News | 29 March 2022 | [Online link](#)

The 2021 WHO catalogue of *Mycobacterium tuberculosis* complex (MTBC) mutations associated with drug resistance: a genotypic analysis

- Analysed 41,137 MTBC isolates with phenotypic and WGS data from 45 countries across six continents to generate a WHO-endorsed catalogue of mutations to serve as a global standard for interpreting molecular information for drug resistance prediction.

The Lancet Microbe | Article | 1 April 2022 | [Online link](#)

Call for good practices

- Aims to raise the profile of AMR on the political agenda and to offer practical solutions through good practices in human, animal and environmental sectors.
- Brings together >60 leading organizations and individuals committed to tackling AMR at national, regional and European level, covering all dimensions of the One Health approach.

AMR Stakeholder Network | Publication | March 2022 | [Online link](#)

How are large-scale One Health initiatives targeting infectious diseases and antimicrobial resistance evaluated? a scoping review

- Results of this scoping review show the range of evaluation methods and indicators used to evaluate the impacts and added value of One Health, as well as their strengths and limitations.

One Health | Article | 24 March 2022 | [Online link](#)

Antimicrobial resistance: a One Health approach

- Improper management of antimicrobials, inadequate control of infections, agricultural debris, pollutants in the environment, migration of people and animals infected with resistant bacteria facilitate the spread of resistance.

Veterinary World | Review article | 28 March 2022 | [Online link](#)