World Health Organization India

sameeksha

ANTIMICROBIAL RESISTANCE (AMR) | Volume 29 | 13 September 2024

AMR *Sameeksha**

Highlights

- Antimicrobial resistance toolkit for media engagement
- NARS-Net and AMRSN annual reports 2023
- Antibacterial pipeline trends and recommendations
- Consumption and rational use of antimicrobials in South-East Asia region, 2024
- WHO global health research priorities for AMR
- Guidance on wastewater and solid waste management for manufacturing of antibiotics

1) Awareness and understanding

Antimicrobial resistance: toolkit for media engagement

- Aims to equip media with guidance and tools to support in-person, online or hybrid approaches to raise AMR awareness.
- Contains three modules (i) step wise guide to media engagement, (ii) tactics for media engagement, (iii) tools and tips.

WHO-FAO-UNEP-WOAH | Publication | 3 June 2024 | Online link

Knowledge, attitudes and practices of antimicrobial resistance awareness among healthcare workers in India: a systematic review

- Finds high levels of knowledge of AMR across healthcare workers (doctors, medical students, nurses, pharmacists, informal providers) but low scores in attitudes and practice, especially among medical students.
- Recommends targeted strategies to address gaps between knowledge and practice for specific healthcare workers while considering regional contexts.

Frontiers in Public Health | Review article | 21 July 2024 | Online link

Patient and public understanding of antimicrobial resistance: a systematic review and meta-ethnography

- Results of 12 qualitative studies synthesized to develop a conceptual model of lay people's perceptions of AMR.
- Calls for revisiting public awareness campaigns by developing strategies that are multimodal, integrate behavioural science and consider diversity (e.g. education, ethnicity) among the public.

JAC – Antimicrobial Resistance | Journal article | 7 August 2024 | Online link

Nurturing tomorrow's antibiotic stewards: an innovative school campaign to combat antimicrobial resistance in Delhi

- Pre- and post-test of a state-wide online school campaign to increase AMR awareness finds improvements in awareness scores among both teachers and students.
- Recommends campaigns to integrate regular activities with schools and communities for a sustained behavioural change.

Indian Journal of Public Health | Notes from the frontline | 4 April 2024 | Online link

2) Laboratories and surveillance

National AMR Surveillance Network (NARS-Net) annual report 2023

- Seventh annual NARS-Net report presents data from 41 sentinel sites in government hospitals in 31 States and Union Territories.
- Reports a gradually increasing resistance in India to both first- and second-line antibiotics over the last several years; and a high percentage of carbapenem resistance in key pathogens isolated from blood.

National Centre for Disease Control | Annual report | 6 August 2024 | Online article

Antimicrobial Resistance Research & Surveillance Network annual report January 2023 to December 2023

- Seventh AMRSN report documents reduced susceptibility to most antibiotics in six key pathogen groups and mechanisms of resistance from tertiary care facilities at four nodal centres and 17 regional centres.
- Gram-negative bacilli remained the most commonly isolated pathogens from most clinically relevant samples and Gram-positive pathogens were common in only pus and exudates.

Indian Council of Medical Research | Annual report | 5 September 2024 | Online article

Surveillance of ventilator associated pneumonia in a network of Indian hospitals using modified definitions: a pilot study

- Develops and tests a ventilator associated pneumonia (VAP) surveillance protocol among ICUs of 13 tertiary care hospitals in the HAI surveillance network coordinated by AIIMS Trauma Centre.
- Recommends further validation in the larger HAI surveillance network in India to assess its applicability across the country.

Lancet Regional Health Southeast Asia | Articles | 18 July 2024 | Online article

Global epidemiology and antimicrobial resistance of Enterobacterales harbouring genes encoding OXA-48-like carbapenemases: insights from the results of the Antimicrobial Testing Leadership and Surveillance (ATLAS) programme 2018–2021

- Finds widespread prevalence of Enterobacterales isolates with *bla* OXA-48-like genes in 42 countries, with India having the highest prevalence (20%).
- Calls for heightened surveillance to capture rising rates and to better understand resistance mechanisms and clinical implications.

Journal of Antimicrobial Chemotherapy | Journal article | 17 May 2024 | Online link

In vitro determination of antifungal susceptibility and virulence factors in *Candida* species causing candidemia in north India region

- Analysis of 120 *Candida* species from blood samples reveals 60% of samples were non-albicans *Candida* while 40% were *C. albicans* with species displaying diverse antifungal sensitivity and resistance to medications.
- Calls for greater monitoring of non-albicans *Candida* with high fluconazole resistance.

Discover Public Health | Research | 5 August 2024 | Online article

Antifungal patterns of dermatophytes: a pathway to antifungal stewardship in eastern India

- Cross-sectional study of 100 patients with clinical symptoms of fungal infections finds *Trichophyton mentagrophytes* as the most common isolate among patients with Tinea infections.
- Among 5 antifungal drugs tested for antifungal susceptibility, terbinafine was most effective with the lowest MICs.

Cureus | Original article | 13 July 2024 | Online article

Monitoring the potential dissemination of antimicrobial resistance in foods, environment, and clinical samples: a One Health prospective

- Sentinel surveillance in Assam, Sikkim, Tripura, and Arunachal Pradesh finds enteric pathogenic isolates at food markets, among food handlers and in clinical samples.
- Pathogens, notably those identified among food handlers, require careful monitoring and improved awareness programs to help reduce AMR in the food chain.

Food Science and Biotechnology | Research article | 8 August 2024 | Online article

3) Infection prevention and control

Sameeksha – Infection Prevention and Control | volume 12

- Need for precise terminology in field of disinfection
- Modelling cholera disease dynamics with delay differential equation
- Compendium of WHO and other UN guidance in health and environment
- Global Infection Prevention and Control Network and public health emergencies
- WHO global research priorities for sexually transmitted infections
- Infection prevention and control workbook

WCO India | Publication | 27 August 2024 | Online link

4) Optimise use of antimicrobials

Modelling the implementation of narrow versus broader spectrum antibiotics in the empiric treatment of *E. coli* bacteraemia

- Using a deterministic state-transition model, study shows use of narrowest spectrum (first line) is a viable option to reduce resistance in second- and third-line antibiotics.
- However, complementary strategies are needed to reduce mortality rates, especially in resource poor contexts.

Scientific Reports | Article | 23 July 2024 | Online link

Consumption and rational use of antimicrobials in South-East Asia Region, 2024

- Presents trends in antimicrobial consumption data by therapeutic groups from six countries (Bangladesh, India, Indonesia, Nepal, Sri Lanka and Thailand).
- Calls for greater adherence to guidelines and regular updates of national lists of essential medicines.

WHO SEARO | Article | 6 September 2024 | Online link

Evaluating the impact of culture-guided antibiotic therapy on clinical outcomes in neonatal septicemia: a cross-sectional study

- Initially giving a broad-spectrum antibiotic to newborns until identification of specific bacteria causing sepsis is generally appropriate.
- High meropenem susceptibility requires targeted therapy.

National Journal of Physiology, Pharmacy and Pharmacology | Research article | 5 July 2024 | Online link

Promoting antifungal stewardship through an antifungal multidisciplinary team in a paediatric and adult tertiary centre in the UK

- Describes clinical, microbiological and financial features of an initiative to improve fungal diagnosis and optimize use of antifungal therapy.
- Demonstrates effectiveness of collaborative approach among experts in mycology, infection and clinicians.

JAC-Antimicrobial Resistance | Journal article | 5 August 2024 | Online link

Excessive prescription duration is a major contributor of inappropriate antibiotic use in primary care

- Pharmaco-economic analysis estimates significant costs saved by addressing prescription practices among general practitioners delivering primary care.
- Calls for more research on how to reduce duration of antibiotics use and the financial implications.

Infectious Diseases Now | Short communication | 14 August 2024 | Online link

Survey of antimicrobial and probiotic use practices in wildlife rehabilitation in the United States

- All 54 rehabilitation centres surveyed reported using antimicrobials, notably enrofloxacin and amoxicillin-clavulanate; one third of centres report not doing any bacterial culture or sensitivity testing.
- Recommends specific guidelines for antimicrobial use for wildlife species.

PLoS One | Research article | 1 August 2024 | Online link

5) Research, innovations and finance

WHO global research priorities for antimicrobial resistance in human health

- Identifies 40 research priorities of bacterial and fungal pathogens of crucial importance to AMR.
- Uses consensus-based and metric approaches to address four research domains (i) descriptions, (ii) delivery, (iii) development and (iv) discovery

Lancet Microbe | Review | 12 August 2024 | Online link

Antibacterial pipeline trends and recommendations to enhance research and development: policy brief

- Summarizes trends in antibacterial pipeline for research and development and for improving equity in access to antibacterials.
- Identifies seven key recommendations for immediate action.

WHO | Policy brief | 5 August 2024 | Online link

Population genomics uncovers global distribution, antimicrobial resistance, and virulence genes of the opportunistic pathogen *Klebsiella aerogenes*

- Sequences 130 *Klebsiella aerogenes* and 1,026 publicly available genomes.
- Finds three carbapenem-resistant high-risk lineages distributed globally.

Cell Reports | Article | 12 August 2024 | Online article

Geographical distribution, disease association and diversity of *Klebsiella pneumoniae* K/L and O antigens in India: roadmap for vaccine development

- Uses whole genome sequencing to examine genetic diversity and potential adaptation mechanisms from 1,072 clinical isolates across 19 states.
- Finds high diversity of *K. pneumoniae* suggesting need for regional strategies in developing vaccines.

Microbial Genomics | Research article | 22 July 2024 | Online link

Multi-year analysis of the global preclinical antibacterial pipeline: trends and gaps

- Characterizes the pipeline as innovative and dynamic with the focus on Gram-negative pathogens, targeting Europe and USA.
- Calls for an equitable approach to ensure the pipeline reaches higher burden areas with unmet needs.

Antimicrobial Agents and Chemotherapy | Minireview | 15 July 2024 | Online link

Macrolones target bacterial ribosomes and DNA gyrase and can evade resistance mechanisms

- Describes structures of ribosome-bound macrolones (synthetic macrolide derivatives with a quinolone side chain) that can interfere with cell metabolism through protein production or DNA gyrase.
- Macrolones with dual targets are less prone to select resistant bacteria or to activate inducible macrolide resistance genes and may help restrict bacteria from becoming resistant.

Nature Chemical Biology | Article | 22 July 2024 | Online link (abstract only)

Antimicrobial resistance of *Clostridioides difficile* in veterinary medicine around the world: a scoping review of minimum inhibitory concentrations

- Review of animal data from 80 studies and >4600 isolates finds genetic diversity of *C. difficile* and ability to infect a range of hosts.
- Stresses the need for international collaboration to establish uniform standards for *C. difficile* antimicrobial susceptibility testing methods and reporting.

One Health | Review article | 24 July 2024 | Online access

6) Collaborations

Guidance on wastewater and solid waste management for manufacturing of antibiotics

- Provides an independent scientific basis for inclusion of targets in binding instruments to prevent the emergence and spread of antibiotic resistance.
- Includes best practices for risk management, including internal and external audit and public transparency, and includes progressive implementation, and stepwise improvement when needed recognizing the need to protect and strengthen the global supply, and to ensure appropriate, affordable and equitable access to quality-assured antibiotics.

WHO | Guidance | 3 September 2024 | Online link

Resistome of the human gut microbiome – a reservoir for emerging threats: a minireview

- Reviews the human gut resistome – the collection of antimicrobial resistant genes (ARGs).
- Describes the biological mechanisms of ARGs and how to use this knowledge to foster global collaborations with a One Health approach.

Journal of Experimental and Laboratory Medicine | Review article | 7 August 2024 | Online link

Analysis of convergence between a unified One Health policy framework and imbalanced research portfolio

- Comparative bibliometric study uses network analysis to assess gaps and content of One Health and AMR.
- Shows that AMR research is dominated by topics, such as *E. coli*, resistance and biofilm, while public and social sciences are largely neglected thereby precluding a comprehensive One Health approach.

Discover Public Health | Research | 30 July 2024 | Online link

Antimicrobial resistance in aquaculture: risk mitigation within the One Health context

- Reviews knowledge base of AMR in aquaculture from a One Health perspective.
- Recommends integrated control of AMR in fisheries in Asia where there is a high rate of resistance.

Foods | Review | 2 August 2024 | Online link

Quotable quote

As part of a comprehensive response, ensure adequate resources – including push and pull incentives – for R&D and equitable and global access of essential and priority health products

– from WHO policy brief on antibacterial pipeline trends and recommendations to enhance R&D, 2024

Sameeksha is a Hindi word, meaning review. This is a compilation of open access publications and resources on One Health containment of AMR (along with a brief summary) – 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.