Sameeksha* – Antimicrobial Resistance (AMR)

Key highlights

- Engaging patients and public in addressing AMR
- Wastewater-based surveillance innovations for infectious diseases
- Protocols, policies and practices on antimicrobial stewardship in resource constrained countries
- Bioinformatic methods for identifying resistance genes in *Escherichia coli*
- Updates from WHO Strategic and Technical Advisory Group for AMR

Strategic priority 1: Awareness and understanding

Antimicrobial resistance as a super wicked problem: how do we engage the public to be part of the solution

- Presents a framework with various approaches to help scientists and health care professionals include patients and public in addressing AMR.
- Proposes adopting a systematic process from initial planning and design to evaluation of interventions.

Infection Prevention in Practice | Commentary | 7 December 2023 | Online link

Antibiotics knowledge, usage, and prescription patterns among dental practitioners in Hyderabad, South India

- Survey of dentists shows that majority are unaware about WHO's AWaRe classification system and antimicrobial stewardship.
- Calls for incorporating AMR and AMS in dental courses and advises dentists to consider antibiotic sensitivity testing before prescribing antibiotics.

Cureus | Research article | 28 November 2023 | Online link

Understanding knowledge and attitude of farmers towards antibiotic use and antimicrobial resistance in Jhunjhunu district, Rajasthan India

- Study finds limited AMR awareness among farmers – with knowledge gaps and poor practices.
- Recommends multifaceted interventions encompassing comprehensive veterinary services, economic incentives, and targeted education.

Antibiotics | Research article | 12 December 2023 | Online link

Eight ways to effectively and responsibly use antimicrobials in plant production

- Two-page brief that presents a quick guide to optimize antimicrobial use in plant production to improve human and animal health, environmental health, and food safety.

FAO | Document | 12 December 2023 | Online link

Gamification as an educational tool to address antimicrobial resistance: a systematic review

▫ Proposes gaming as a promising approach to improve AMR knowledge, promote antimicrobial stewardship and enhance retention of information.
▫ Highlights inadequate focus on content and effectiveness of such games, and insufficient studies reporting games addressing AMR in animal and environmental sectors.

JAC – Antimicrobial Resistance | Systematic review | 11 December 2023 | Online link

Strategic priority 2: Laboratories and surveillance

Wastewater-based surveillance as a tool for public health action: SARS-CoV-2 and beyond

▫ Reviews wastewater-based surveillance (WBS) innovations and their application to infectious diseases, including resource constraint settings.
▫ Presents opportunities and challenges in using WBS for AMR – highlighting its role in infection prevention and antimicrobial stewardship in hospitals.

Clinical Microbiology Reviews | Review article | 14 December 2023 | Online link

Role of the first WHO mutation catalogue in the diagnosis of antibiotic resistance in *Mycobacterium tuberculosis* in the Valencia Region, Spain: a retrospective genomic analysis

▫ Shows that WHO mutation catalogue improves detection of drug resistant tuberculosis and supports tailored treatment in low burden contexts.
▫ Discusses the possibility of whole genome sequencing based drug susceptibility testing based on future updates of the catalogue.

Lancet Microbe | Research article | 4 December 2023 | Online link

Global *Streptococcus pyogenes* strain diversity, disease associations, and implications for vaccine development: a systematic review

▫ Reports a greater *S. pyogenes* (a Group A Streptococcus) strain diversity in countries with lower human development index, suggesting the role of social determinants in diseases caused by *S. pyogenes*.
▫ Suggests considering multiple strains and socioeconomic context in the development of a vaccine.

Lancet Microbe | Systematic review | 6 December 2023 | Online link

Application of diagnostic network optimization in Kenya and Nepal to design integrated, sustainable and efficient bacteriology and antimicrobial resistance surveillance networks

▫ Reports on application of diagnostic network optimization (a geospatial network analytics approach) to strengthen AMR surveillance in humans (Kenya) and animals (Nepal).
▫ Highlights benefits of data driven approach for designing efficient diagnostic networks for better resource allocation and enhancing health equity.

PLoS Global Public Health | Research article | 6 December 2023 | Online link

Genomic insights into *Enterococcus faecium* isolates from marine bivalves highlight One Health concerns and healthcare linkages

- Study of bivalves (clams, oysters, mussels, etc.) along the Norwegian coast provides baseline data on AMR in *Enterococci* from the marine environment and reports high prevalence but low concentration of *Enterococci*, with low levels of AMR.
- Shows that very few *E. faecium* isolates may have arisen from human healthcare system.

Microbial Genetics | Research article | 12 December 2023 | Online link

Strategic priority 3: Infection prevention and control

Sameeksha – Infection Prevention and Control | volume 6

- Genomic analysis of AMR to support IPC in healthcare facilities
- Declaration on infection prevention and management in global surgery
- Updated guidelines on IPC in the context of COVID-19
- Interactive game to promote hand hygiene compliance
- WHO standardized checklist to assess sanitation facilities

WCO India | Publication | 10 January 2024 | Online link

Strategic priority 4: Optimise use of antimicrobials

Protocols, policies and practices for antimicrobial stewardship in hospitalized patients in least-developed and low-income countries: a systematic review

- Reviews evidence on the use of antimicrobial stewardship programs in low-income countries.
- Proposes four best practices – (i) use of multidisciplinary teams integrating IPC, (ii) antimicrobial surveillance, (iii) constructive feedback on clinical team performance, and (iv) standardized data collection on outcomes – microbial, clinical, and prescription.

Antimicrobial Resistance & Infection Control | Systematic review | 23 November 2023 | Online link

A hidden gem in multidisciplinary antimicrobial stewardship: a systematic review on bedside nurses' activities in daily practice regarding antibiotic use

- Reports that beside nurses (defined as nurses who perform direct patient care activities) perform antimicrobial stewardship activities during daily practice.
- Recommends empowering nurses through education and recognition of their contributions to antimicrobial stewardship.

Antimicrobial Resistance & Infection Control | Systematic review | 23 November 2023 | Online link

Strategies to reduce antimicrobials in livestock and aquaculture, and their impact under field conditions: a structured scoping literature review

- Reviews alternatives to antimicrobial use in livestock production and highlights the need for context and species-specific interventions.
- Key promising strategies include bioactive protein and peptides, management of water and feed, and probiotics.

Journal of Antimicrobial Chemotherapy | Review article | 10 November 2023 | Online link

How to use antimicrobials effectively and responsibly in plant production, for the sake of human and plant health

- Outlines key strategies in antimicrobial stewardship for plant health, including minimal use of antimicrobials for plant diseases and safe disposal of expired and unused antimicrobial containers.

FAO | Document | 2023 | Online link

Ground level utility of Access, Watch, Reserve classification: insights from a tertiary care center in North India

- Reports use of roughly 58%, 38% and 4% of Access, Watch, and Reserve (AWaRe) antibiotics, respectively.
- Highlights the need for better antimicrobial prescriptions and AMR awareness including AWaRe classification.

World Journal of Experimental Medicine | Research article | 20 December 2023 | Online link

Strategic priority 5: Research, innovations and finance

Discordance between different bioinformatic methods for identifying resistance genes from short-read genomic data, with a focus on *Escherichia coli*

- Comparison of four AMR gene typing programs on simulated and real datasets of *E. coli* highlights variable outputs due to underlying assumptions in each algorithm.
- Calls for developing new and more robust bioinformatic methods to improve accuracy of AMR detection.

Microbial Genomics | Research article | 15 December 2023 | Online link

Environmental determinants and demographic influences on global urban microbiomes, antimicrobial resistance and pathogenicity

- Assesses influence of environmental and demographic characteristics on global urban microbiome.
- Prevalence and abundance of AMR genes is associated with lower GDP per capita and higher solar radiation, highlighting need for urban planning and public health policies that reduce AMR.

npj Biofilms and Microbiomes | Research article | 7 December 2023 | Online link

Healing wounds, defeating biofilms: *Lactiplantibacillus plantarum* in tackling MRSA infections

- Lp2621, a cell-free supernatant of a probiotic bacteria, demonstrates anti-bacterial properties against methicillin resistant *S. aureus*, by preventing biofilm formation.
- Further research can specify mechanisms involved and assess therapeutic benefits.

Frontiers in Microbiology | Research article | 5 December 2023 | Online link

Antimicrobial resistance expansion in pathogens: a review of current mitigation strategies and advances towards innovative therapy

- Reviews key innovations in addressing AMR, including efflux activity inhibition, nanoantibiotics, CRISPR-Cas9 gene editing technique etc.
- Highlights importance of continued research and development of innovative strategies to mitigate AMR, while prioritizing antimicrobial stewardship.

JAC – Antimicrobial Resistance | Review article | 11 December 2023 | Online link

AHHME: a model for estimating the holistic cost-effectiveness of antimicrobial resistance interventions in food animal production

- Presents a mathematical tool to model and evaluate AMR interventions integrating human health, food animal productivity, labour productivity and healthcare costs.
- Encourages researchers and policymakers to adapt the model to context and to use with farm-level trials and big data initiatives.

One Health | Article | 21 September 2023 | Online link

Strategic priority 6: Collaborations

Strategic and Technical Advisory Group for Antimicrobial Resistance (STAG-AMR)

- Outlines progress and discussion on several areas of global AMR work including STAG-AMR recommendations to the WHO Director General.
- Highlights key observations, recommendations and discussions in preparation of United Nations General Assembly High-Level Meeting on AMR.

WHO | Meeting report | 13 June 2023 | Online link

The role of stakeholders' understandings in emerging antimicrobial resistance: a One Health approach

- Reviews evidence on antibiotic use and mitigating AMR across four sectors – veterinary, environmental, health, and agroecosystems.
- Underscores need for collaboration among One Health stakeholders to achieve optimal health for humans, animals, plants, and the environment.

Microorganisms | Review article | 17 November 2023 | Online link

The One Health High-Level Expert Panel (OHHLEP)

- Details OHHLEP and its activities focused on One Health, prevention and surveillance of emerging zoonoses, and factors contributing to disease spillover.

One Health Outlook | Commentary | 7 December 2023 | Online link

Quotable quote

AMR – especially to bacterial drugs – is a global health threat. With the aim of making Kerala 'Antibiotic Literate' the state government has developed a scientific programme of action to prevent the excessive and unnecessary use of antibiotics. For this, AMR committees have been formed at the district and block level for the first time in the country.

– Smt Veena George,
Minister for Health, Women and Child Development, Government of Kerala