World Health Organization India

sameeksha

ANTIMICROBIAL RESISTANCE (AMR) | Volume 14 | 21 April 2023

*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 14

- WHO guidance on nationally representative AMR surveys for surveillance of bloodstream infections
- Guidelines for diagnosis, treatment and prevention of infections by carbapenem-resistant gram-negative bacilli
- Global distribution of One Health Networks
- Outbreak of multi-drug resistant *Klebsiella pneumonia* among neonates admitted to a neonatal ICU

Strategic priority 1: Awareness and understanding

Knowledge, attitudes and practices regarding antimicrobial use and resistance among healthcare seekers in two tertiary hospitals in Ghana: a quasi-experimental study

- Study designed to assess an AMR mitigation intervention that involved communicating the health and economic implications of AMR to patients.
- Intervention group reported willingness to pay more to avert AMR compared to those in the control group.

BMJ Open | Research article | 22 February 2023 | Online link

Understanding of final year medical, pharmacy and nursing students in Pakistan towards antibiotic use, antimicrobial resistance and stewardship

- Survey of 1251 final year students indicated good foundational knowledge of AMR but limited understanding of secondary infections and cross-resistance.
- Highlights the need for curriculum revision to include antimicrobial stewardship programmes.

Antibiotics | Research article | 10 January 2023 | Online link

Strategic priority 2: Laboratories and surveillance

Guidelines for the diagnosis, treatment, prevention and control of infections caused by carbapenem-resistant gram-negative bacilli

- Clinical guidelines focusing on carbapenem-resistant gram-negative bacilli (CRGNB) – carbapenem-resistant Enterobacterales (CRE), carbapenem-resistant *Acinetobacter baumannii* (CRAB), and carbapenem-resistant *Pseudomonas aeruginosa* (CRPA).
- Details 16 recommendations for diagnosing, treating and preventing CRGNB infections.

Journal of Microbiology, Immunology and Infection | Guidelines | 18 February 2023 | Online link

Metagenomic insight into microbiome and antibiotic resistance genes of high clinical concern in urban and rural hospital wastewater of Northern India origin: a major reservoir of antimicrobial resistance

- Shotgun metagenome sequencing was performed on wastewater of six hospitals in North India.
- High abundance and diversity of ARGs highlights the need for better wastewater treatment in hospitals.

Environmental Microbiology | Research article | 14 February 2023 | Online link

A systematic approach toward progressive improvement of national antimicrobial resistance surveillance systems in food and agriculture sectors

- FAO has developed an Assessment Tool for Laboratories and Antimicrobial Resistance Surveillance Systems (FAO-ATLASS), which is composed of a surveillance and a laboratory module.
- Aims to help countries bolster AMR surveillance in food and animal sectors.

Frontiers in Veterinary Science | Methods article | 7 February 2023 | Online link

Hypervirulent Klebsiella pneumoniae causing neonatal bloodstream infections: emergence of NDM-1-producing hypervirulent ST11-K2 and ST15-K54 strains possessing pLVPK-associated markers

- More than 50% of strains carbapenem-resistant *Klebsiella pneumoniae* causing neonate sepsis were resistant to 9 or more antimicrobials.
- Reports fatal neonatal sepsis linked with NDM-1-producing hvKP ST11-K2 and ST15-K54 strains.

Microbiology Spectrum | Research article | 8 February 2023 | Online link

Strategic priority 3: Infection prevention and control

Assessment of the occupational risk of tuberculosis & air borne infection control in high-risk hospital wards and its implications on healthcare workers in a tertiary care hospital in South India

- Assessed quality of hospital air with microbial air sampler and estimated burden of TB among HCWs.
- Bacterial count of air was 288 CFU/m^3 which exceeded normal limits of ≤50 CFU/m^3; TB incidence was 21%.
- Highlights the need for investment in air-borne infection control measures.

Cureus | Research article | 15 January 2023 | Online link

Multinational prospective cohort study of rates and risk factors for ventilator-associated pneumonia over 24 years in 42 countries of Asia, Africa, Eastern Europe, Latin America, and the Middle East: findings of the International Nosocomial Infection Control Consortium (INICC)

- Assessment of rates for ventilator-associated pneumonia (VAP) and risk factors for VAP across 743 ICUs showed a VAP rate of 11.7 for LMICs, and 14.3 for India.
- Highlights the need to focus on modifiable risk factors – such as reducing length of stay and mechanical ventilation – to reduce VAP.

Antimicrobial Stewardship and Healthcare Epidemiology | Research article | 9 January 2023 | Online link

Outbreak of colistin resistant, carbapenemase (blaNDM, blaOXA-232) producing Klebsiella pneumoniae causing blood stream infection among neonates at a tertiary care hospital in India

- Describes an outbreak of multi-drug resistant *Klebsiella pneumoniae* among neonates in a NICU.
- Highlights the importance of early detection, surveillance, rapid corrective measures and IPC as critical to ending the outbreak and preventing further spread in the community.

Frontiers in Cellular and Infection Microbiology | Research article | 1 February 2023 | Online link

Infections in critically ill children

- Reviews health care-associated infections common in pediatric ICUs.
- Details epidemiology, risk factors, pathogenesis, prevention, stewardship and surveillance strategies.

Indian Journal of Pediatrics | Review article | March 2023 | Online link

Strategic priority 4: Optimise use of antimicrobials

Rationality of prescriptions by rational use of medicine consensus approach in common respiratory and gastrointestinal infections: an outpatient department based cross-sectional study from India

- Prescription audit in West Bengal showed deviations from standard treatment guidelines in majority of prescriptions (98.9%) and a high antibiotic prescription rate (57%).
- Highlights the need for capacity building of prescribers towards AMR and optimal antimicrobial use.

Tropical Medicine and Infectious Disease | Research article | 28 January 2023 | Online link

The role of multidimensional poverty in antibiotic misuse: a mixed-methods study of self-medication and non-adherence in Kenya, Tanzania, and Uganda

- Data from 6,827 outpatients with urinary tract infection symptoms were linked with qualitative data to assess the relationship between antibiotic misuse and multidimensional poverty in three East African countries.
- Antibiotic misuse was less common among those living in multidimensional poverty and was described to be driven by perceived inconvenience of healthcare system, financial barriers, and ease of unregulated antibiotic access.
- Highlights the need to address structural barriers to optimise antibiotic use across all socioeconomic groups.

The Lancet Global Health | Research article | January 2023 | Online link

Strengthening antimicrobial stewardship activities in secondary and primary public healthcare facilities in India: insights from a qualitative study with stakeholders

- In-depth interviews were conducted with national and state (Haryana) stakeholders to assess barriers and opportunities for antimicrobial stewardship (AMS).
- AMS could be strengthened by integrating WHO AWaRe classification into Essential Medicine List and leveraging AMS components of other relevant programs, such as *Kayakalp* and National Quality Assurance Programme.

Indian Journal of Medical Microbiology | Research article | 13 January 2023 | Online link

Point prevalence study (PPS) of antibiotic usage and bacterial culture rate (BCR) among secondary care hospitals of small cities in Central India: consolidating Indian evidence

- Provides baseline data on antibiotic consumption in secondary care hospitals in India through a prospective longitudinal observational chart review of 864 patients in three cities of Madya Pradesh.
- Point prevalence was 66% for IV antibiotics; mean scores were 42%, 53% and 5.5% for Access, Watch and Reserve antibiotics respectively, as per WHO AWaRe classification.
- Highlights the importance of trained microbiologists and stewardship at all levels of the health system.

Journal of Laboratory Physicians | Original article | 9 February 2023 | Online link

Strategic priority 5: Research, innovations, and finance

Methodological principles of nationally representative surveys as a platform for global surveillance of antimicrobial resistance in human bloodstream infections

- Technical guidance for national AMR prevalence surveys targeting blood stream infections (BSIs) to generate reliable and representative national AMR data.
- Outlines key principles, including target bacteria and antimicrobials, sampling considerations, laboratory methods, data analysis, surveillance approaches, ethics and dissemination tactics.

WHO | Publication | 16 February 2023 | Online link

Computational biology: role and scope in taming antimicrobial resistance

- Reviews how computational biology can contribute to addressing AMR in relation to next generation sequencing, structural bioinformatics and artificial intelligence.
- Interdisciplinary research integrating whole genome sequencing, publicly available databases and tools are critical for understanding genetic diversities and developing novel clinical solutions.

Indian Journal of Medical Microbiology | Review article | 4 January 2023 | Online link

Natural killers: opportunities and challenges for the use of bacteriophages in microbial food safety from the One Health perspective

- Reviews the use of bacteriophages to prevent water and food-borne diseases.
- In addition to good hygiene practices during food production, phages can be used in each stage of food supply/production chain to help reduce AMR and food-borne diseases.
- Supports the establishment of a legal framework and regulations to allow the use of phages in reality, including for food safety.

Foods | Review article | 26 January 2023 | Online link

Reservoirs of antimicrobial resistance in the context of One Health

- Human microbiome is an important AMR reservoir, and human–animal–environment interactions favour the spread of AMR and antimicrobial resistance genes (ARGs).
- Spread of ARGs between humans, animals and environment are reviewed, and identifies the challenges to assessing directionality of ARG transmission in One Health studies.
- Highlight the importance of One Health for understanding AMR transmission and spread.

Current Opinion in Microbiology | Review article | 11 March 2023 | Online link

Strategic priority 6: Collaborations

A global analysis of One Health Networks and the proliferation of One Health collaborations

- Global analysis of One Health Networks (OHNs) identified emerging infections and priority pathogens as a key focus with less attention to other hazards, global health security and integration of environmental stakeholders.
- Skewed distribution of OHNs with a concentration in Europe, needs redistribution to achieve One Health globally.

The Lancet | Research article | 16 February 2023 | Online link

Factors impacting antimicrobial resistance in the South East Asian food system and potential places to intervene: a participatory, One Health study

- AMR experts from South-East Asia used causal loop diagrams to identify regional determinants of AMR.

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