
Integrated Activities and Tools for Antimicrobial Stewardship





ANTIMICROBIAL RESISTANCE (AMR)

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Our time with **ANTIBIOTICS** is running out.

Antibiotics are in danger of losing their effectiveness due to misuse and overuse, and in many cases they aren't even needed.

**Always seek the advice of
a healthcare professional
before taking antibiotics.**

WHAT IS ANTIMICROBIAL RESISTANCE?



ANTIMICROBIAL RESISTANCE

Antibiotic resistance (AMR) is increasingly being recognized as one of the most serious threats to public health

Resistance is everywhere and anywhere; countries have varying rates of resistance

KEY DEFINITIONS

Antimicrobial resistance (AMR): ability of micro-organism to multiply or persist in the presence of an antimicrobial

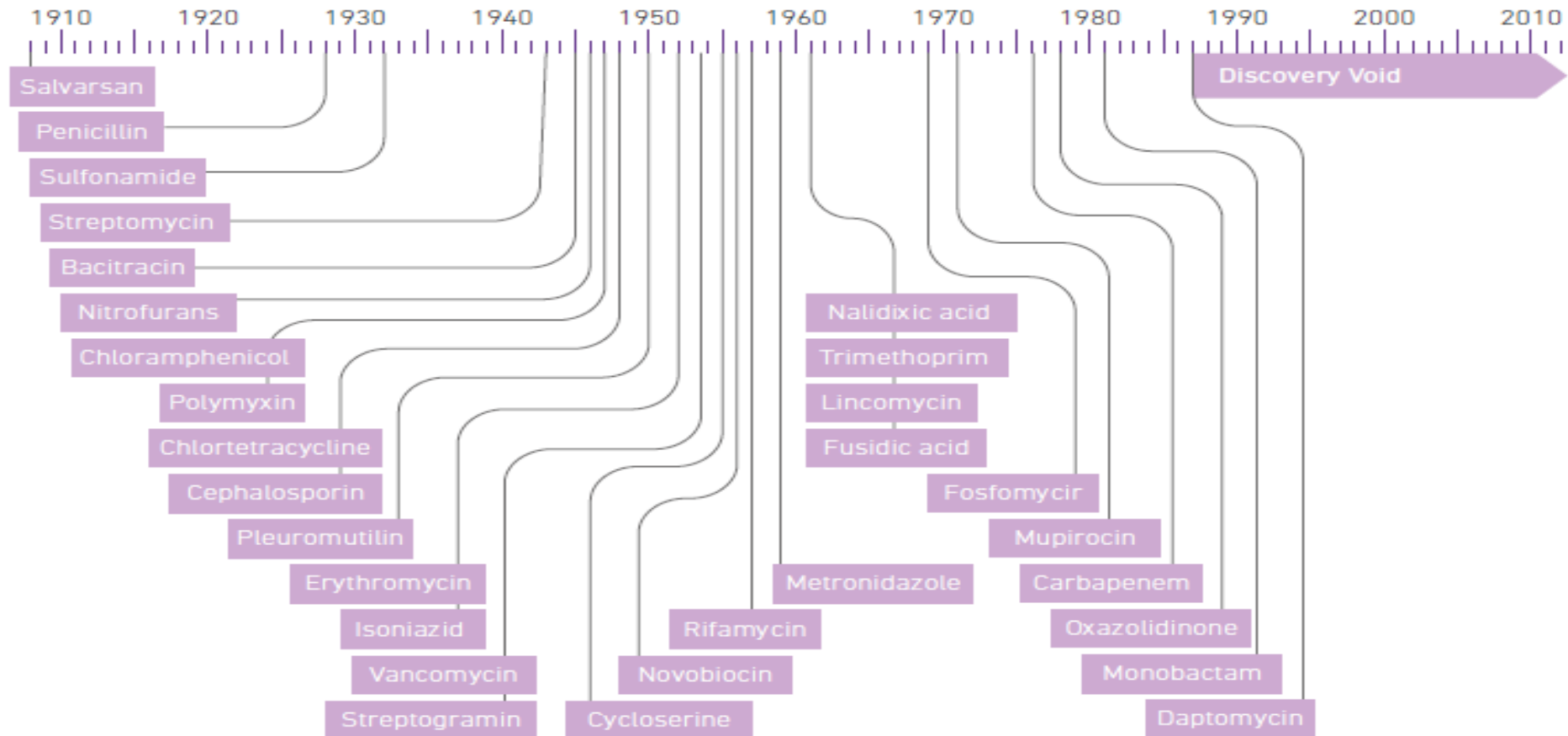
Antibiotics: chemical substances that kill or inhibit growth of bacteria in their natural environment

- Work by inhibiting various sources of growth and multiplication

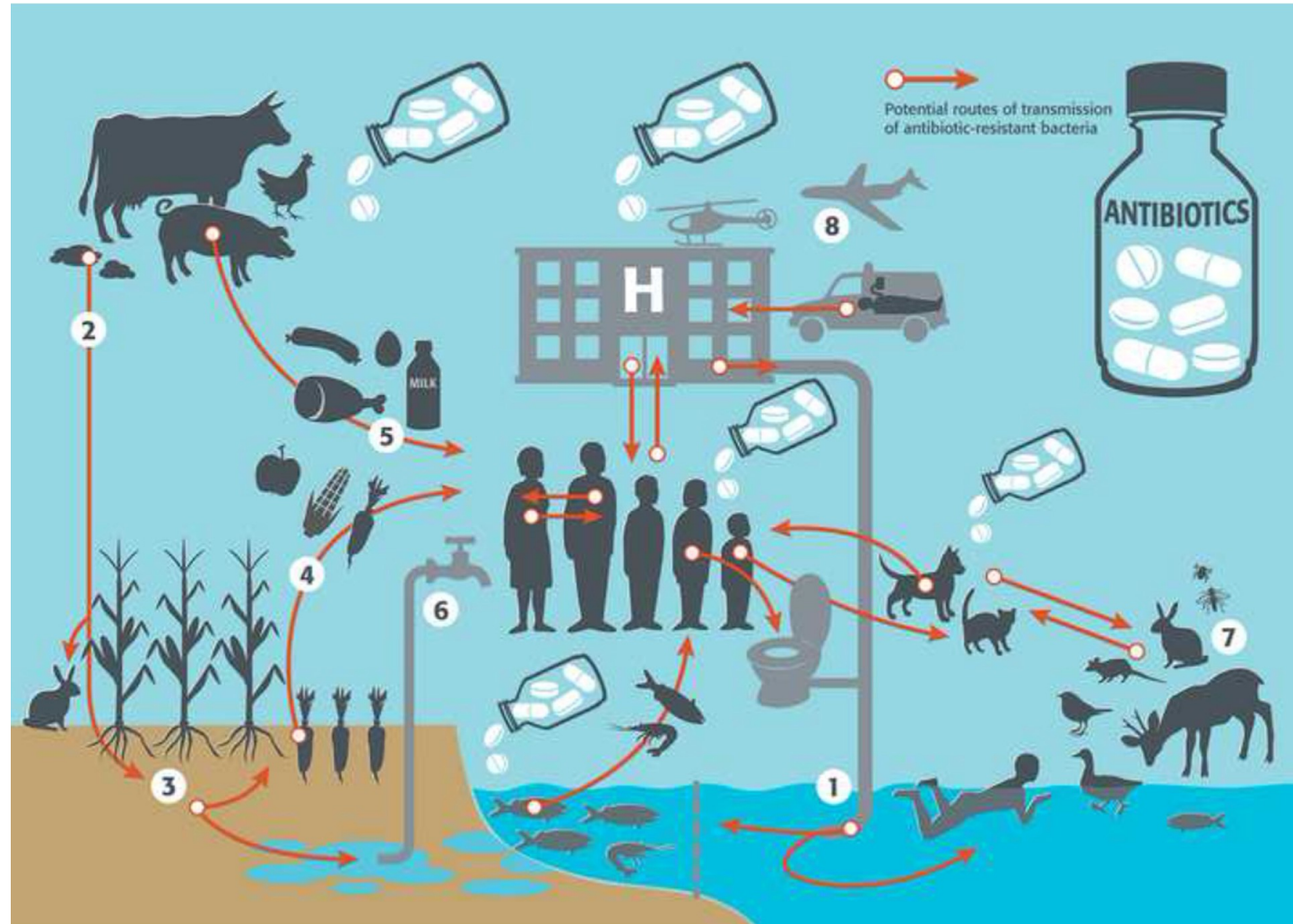
THE PAST...

Figure 1 Dates of discovery of distinct classes of antibacterial drugs

Illustration of the "discovery void." Dates indicated are those of reported initial discovery or patent.



THE PRESENT...



THE PRESENT...

50% of all antimicrobials prescribed to people are considered unnecessary

WHO IS PRESCRIBING?



General practice



Hospital inpatients



Hospital outpatients

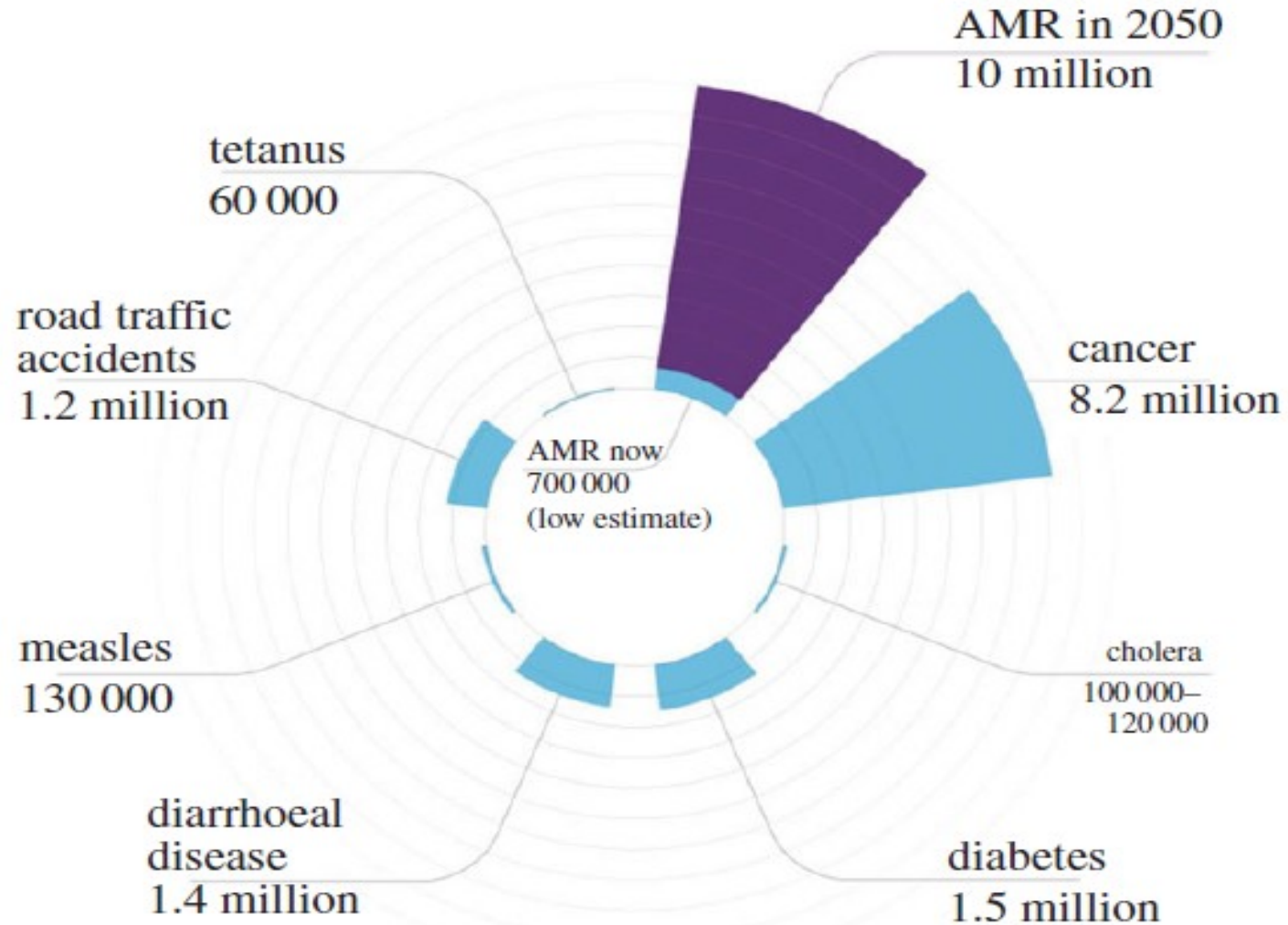


Dental practices



Other community settings

THE FUTURE...



ESTIMATING THE BURDEN OF AMR



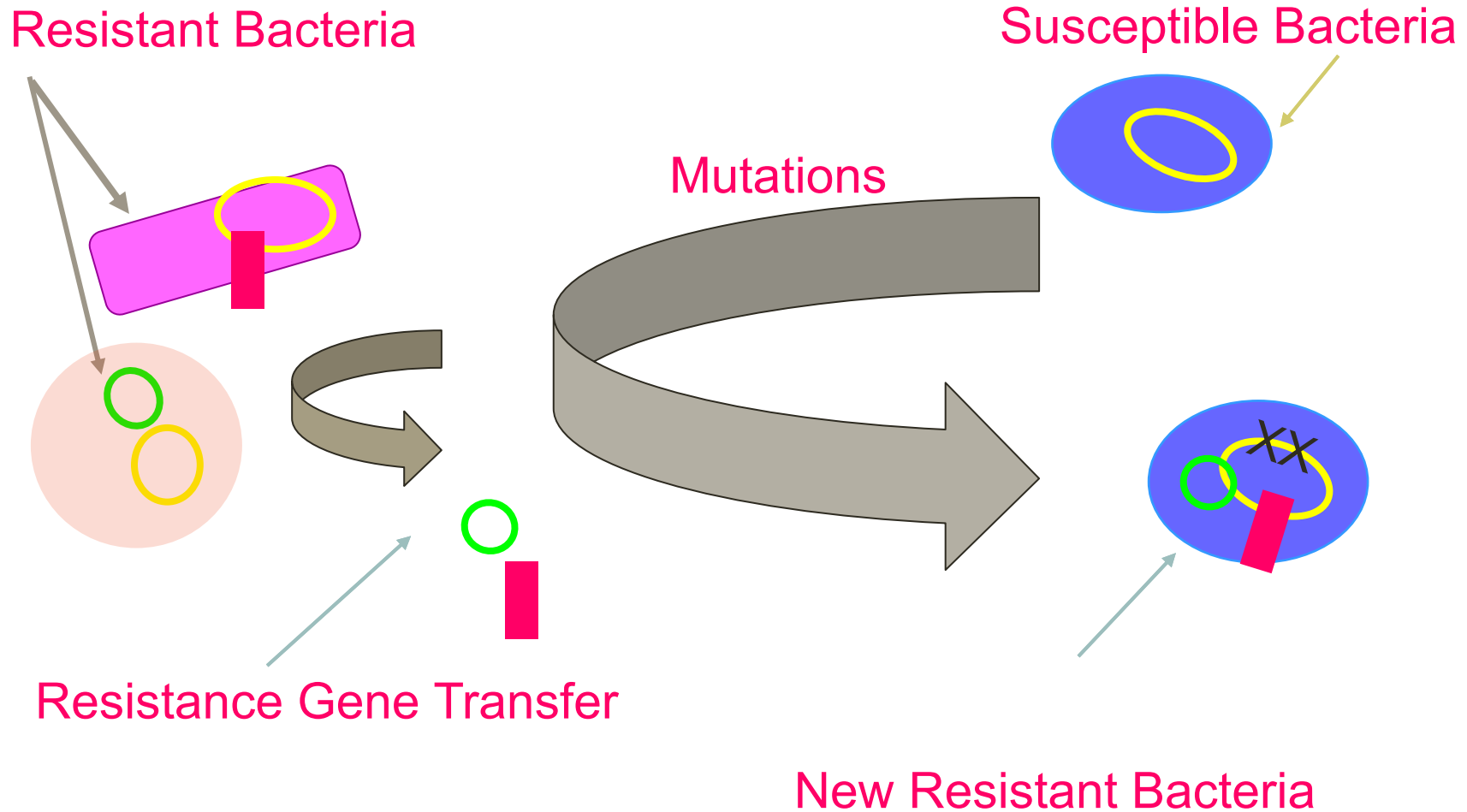
Global information is insufficient to show complete disease burden impact and costs

Source: WHO Global Report on Surveillance 2014

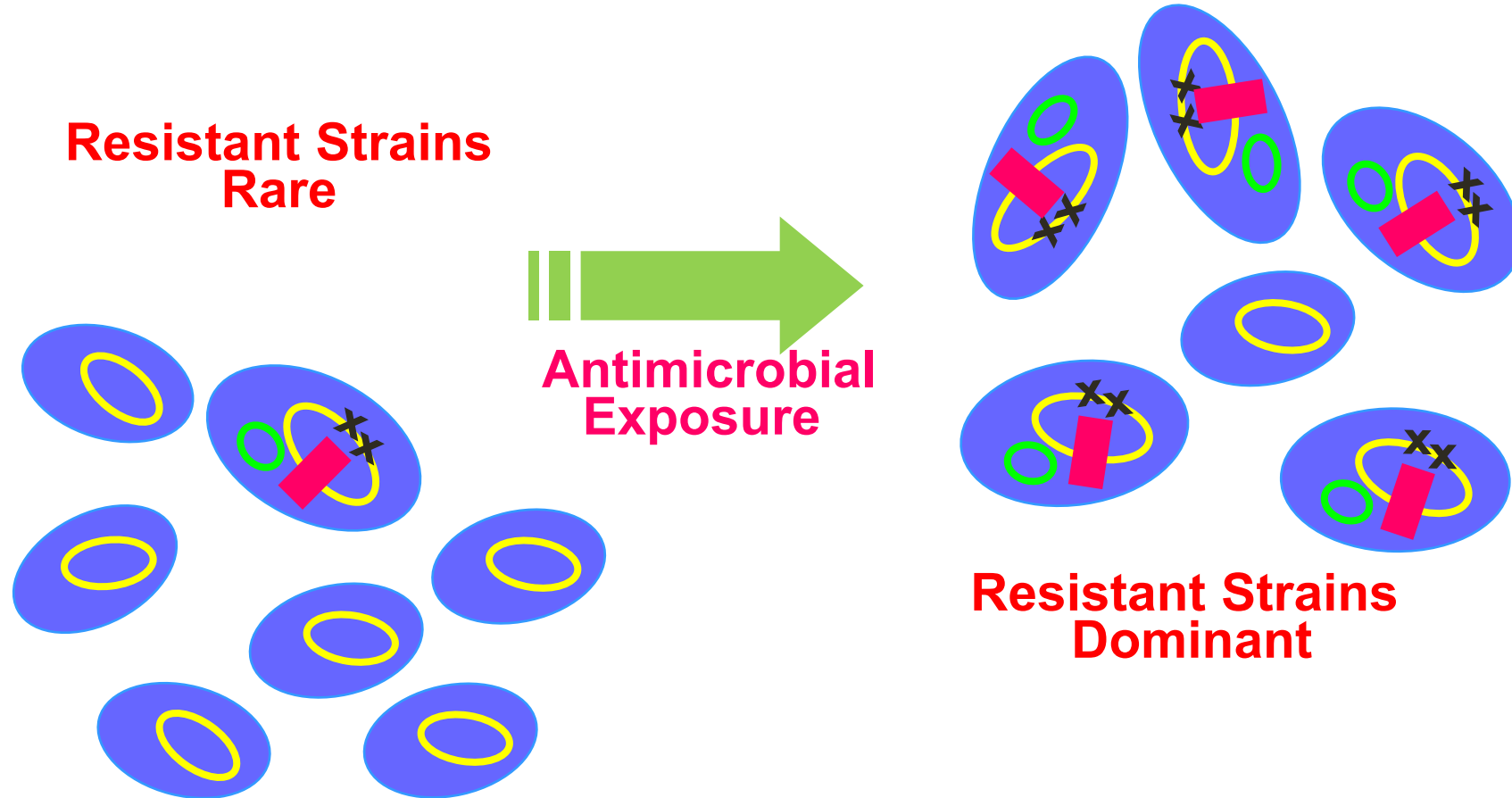
WHAT ARE THE DRIVERS OF RESISTANCE?



BACTERIA ARE EVOLVING...



WE SELECT FOR RESISTANCE WITH ANTIMICROBIALS



HOW COMMON ARE MDRO IN NEPAL?

CRE; resistance in *K pneumoniae* (30%), *E coli* (7%), *Acinetobacter* (80%)

ESBL; resistance in *K. pneumoniae* (75%), *E. coli* (77%)

MRSA; 35% *S. aureus*

VRE: no

Colistin: 3% MDR *E. coli* and *K. pneumoniae* (July 2021)

DRIVERS OF RESISTANCE

Inappropriate
antibiotic use

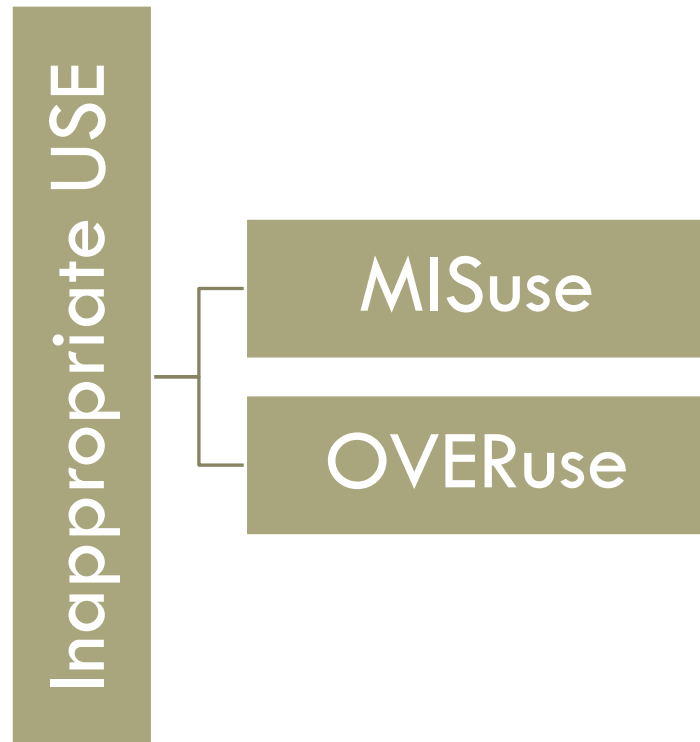
Health care
transmissions

Environmental
contamination

Travel

Gaps in public
knowledge

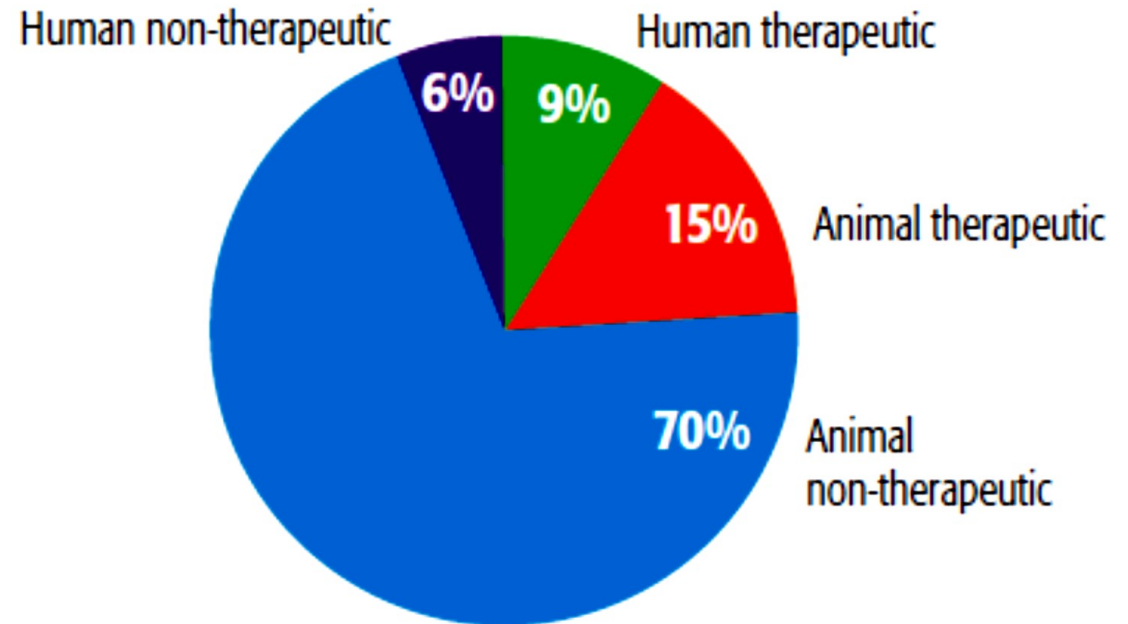
INAPPROPRIATE ANTIBIOTIC USE:



- Up to 50% of all antimicrobials prescribed to people are considered unnecessary
- OTC is a major means of self-prescribing antibiotics
- The most common misuse occurs with respiratory infections such as acute pharyngitis and acute bronchitis

INAPPROPRIATE ANTIBIOTIC USE:

- More antimicrobials are used in food production than in human beings
- Selective pressure exerted by antimicrobial use outside of human medicine, namely in veterinary medicine, food-animal and fish production, and agriculture gave rise to AMR



Healthcare transmissions:

A number of factors contribute to spread and acquisition of AMR in a hospital or health care setting

The concentration of antibiotic prescribing might be highest in inpatient settings

- Lack of training and financial resources
- Poor infection control practices
- Defects in rapid diagnostics
- Sub-optimal preventive medicine practices

ENVIRONMENTAL CONTAMINATION:

Waste products from antibiotics entering the environment

- Through manufacture, sewage and disposal
- These antibiotics can select the growth of resistant organisms

There is transfer of resistance genes to surrounding commensal organisms and pathogens

- In low-income countries and developing nations, with over-crowding and poor sanitation there is easy spread to the human population
- There are no regulations governing the discharge of antimicrobial waste into the environment

TRAVEL:

Travelers can acquire both benign and resistant pathogenic bacteria through everyday activities such as eating, drinking and touching

- Animals and imported food can transport bacteria

More recently, and perhaps more worryingly, is the spread of carbapenem resistance mechanisms across the world, and between organisms, with New Delhi metallo- β -lactamase (NDM), *Klebsiella pneumoniae* carbapenemases, and OXA-485 enzymes being among those of greatest concern

“At the macroscopic level, resistance can travel around the world as fast as a commercial airline flight,” commented Louise K. Francois Watkins, MD, of the CDC’s Division of Foodborne, Waterborne, and Environmental Diseases, during a session at IDWeek 2019, in Washington, D.C.



GAPS IN PUBLIC KNOWLEDGE:

The population may not have necessary skills to make effective use of the information provided and there can be a lot of misconceptions

For such reasons, scientific and health policy messages that focus largely on clinical and epidemiological consequences of inappropriate use of antibiotics may fail to engage the attention of the public

Clear messages will need to be conceptualized, developed and appropriately disseminated

WHAT ARE THE CONSEQUENCES OF RESISTANCE?



WHY IS THIS A CONCERN?

Threatens our ability to treat common infections

- The number of people who fail treatment or die of infections will increase
- Routine medical procedures will become more risky

Increased cost to national economies and health systems

- Prolonged hospital stays
- Need for more expensive and intensive care

WHAT ARE THE THREATS?

Carbapenem-resistant Enterobacteriaceae (CRE)

Drug-resistant *Neisseria gonorrhoeae*

Multidrug-resistant *Acinetobacter*

Drug-resistant *Campylobacter*

Colistin resistant Enterobacteriaceae

Extended spectrum β -lactamase producing Enterobacteriaceae (ESBLs)

Vancomycin-resistant *Enterococcus* (VRE)

Multidrug-resistant *Pseudomonas aeruginosa*

Drug-resistant Non-typhoidal *Salmonella*

Drug-resistant *Salmonella* Typhi

Drug-resistant *Shigella*

Methicillin-resistant *Staphylococcus aureus* (MRSA)

Drug-resistant *Streptococcus pneumoniae*

Drug-resistant tuberculosis

Vancomycin-resistant *Staphylococcus aureus* (VRSA)

Erythromycin-resistant Group A *Streptococcus*

Fluconazole-resistant *Candida* (a fungus)

MDR/XDR Mycobacterium tuberculosis

WHAT ARE THE STRATEGIES FOR CONTAINMENT?



ADDRESSING THE GLOBAL THREAT OF ANTIMICROBIAL RESISTANCE: THE UN RESOLUTION

Each country should have plans for antimicrobial resistance reduction, and be done in context of 'One Health'

Overall plan components:

- Build laboratory capacity
- Improve surveillance
- New tests and diagnostics
- New drugs
- Antimicrobial stewardship; both inpatient and outpatient, formal and informal sectors
- Reduce use of antibiotics in food animals, elimination of growth promoting antibiotics
- Better infection control
- Improve prevention strategies; eg immunization
- Innovation; alternatives to antibiotics

WHO ACTION PLAN TO REDUCE ANTIMICROBIAL RESISTANCE

Improve awareness and understanding of antimicrobial resistance

Strengthen knowledge through surveillance and research

Reduce incidence of infection

Optimize the use of antimicrobial agents

Develop the economic case for sustainable investment that takes account of the needs of all countries

Increase investment in new antibiotics, diagnostics, vaccines and other interventions

NEPAL'S NATIONAL ACTION PLAN

Multi-sectoral Steering Committee - AMR



National Technical Working Committee - AMR



Technical Working Group

STRATEGIC PRIORITY 1: IMPROVE AWARENESS AND UNDERSTANDING OF AMR THROUGH EFFECTIVE COMMUNICATION, EDUCATION AND TRAINING

Awareness and understanding

Establish AMR awareness mass communication Programme based on scientific evidence in human health, veterinary, pharmaceutical, environment, farmers, food production and processing sector

Educate the general population including professionals in health, agriculture, veterinary, pharmaceutical, environment, farmers, and food processing sector

Education and training

Include AMR in professional curriculum, education and training of professionals in human health, veterinary, agriculture, pharmaceutical, environment, and food and feed sector

Develop multisectoral (one-health) coalition to coordinate in containing AMR and mechanism to prioritize AMR by line ministries

**STRATEGIC PRIORITY 2: STRENGTHEN THE KNOWLEDGE AND EVIDENCE
THROUGH SURVEILLANCE AND RESEARCH**

Surveillance

Establish a national surveillance system for antimicrobial resistance

Designate national reference laboratory for AMR

Standardize AMR surveillance data management

Establish data management system to get quality surveillance data which can be used and shared regionally and globally for future decisions

Establish surveillance system for antimicrobial residues and contaminants in food and the environment

Strengthen Microbiology Lab Capacity

STRATEGIC PRIORITY 3: REDUCE THE INCIDENCE OF INFECTION THROUGH EFFECTIVE INFECTION PREVENTION AND CONTROL

Infection prevention and control (IPC) in health care

Establish mechanism to ensure development and implementation of infection prevention and control guideline in all healthcare facilities

Infection prevention and control (IPC) in animal health

Establish mechanism to ensure development and implementation of infection prevention and control guideline in all veterinary, animal husbandry settings

Hygiene, sanitation and Infection prevention in the community

Promote personal hygiene through behavioural change activities

Environmental control in spread of AMR

STRATEGIC PRIORITY 4: OPTIMIZE THE USE OF ANTIMICROBIAL AGENTS IN HEALTH, ANIMALS AND FOOD

Regulated access to high-quality antimicrobials

Strengthen national regulatory authorities for improved quality, safety and efficacy of antimicrobials.

Surveillance of Antimicrobial use

Institutionalize national surveillance system for antimicrobial use (AMU) in humans, animals, agriculture & food sectors in all level of government

Antimicrobial stewardship in human health

Establish antimicrobial stewardship programs in healthcare facilities

Antimicrobial stewardship in animal health and food sector

Establish antimicrobial stewardship programs in animal healthcare facilities



**STRATEGIC PRIORITY 5: PROMOTE INVESTMENTS FOR AMR
ACTIVITIES, RESEARCH AND INNOVATIONS**

Investment for AMR

Formulate sustainable investment strategy to fund NAP AMR
implementation plan nationwide

Research and Innovation

Conduct the basic and operational research to contain AMR

CONCLUSION

The global crisis on antimicrobial resistance is getting major international attention

Efforts are starting to follow

Now the really hard part starts...

- How can we get the resources to solve the problem?
- How can we be most effective in addressing this problem?
- What can each country do to address resistance?
- How can we work to do more together?