Laboratory perspective of combating AMR

64th Myanmar Medical Conference

Prof: Htay Htay Tin
National focal point of AMR

Introduction of AMR

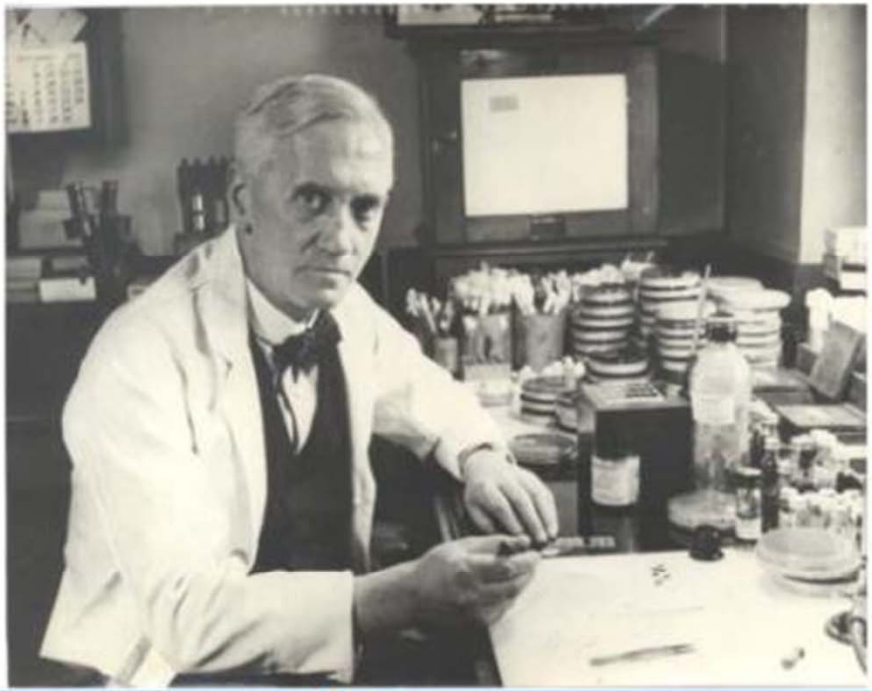
- Antimicrobial Resistant(AMR) pathogens are rising at alarming rates and threaten the health of humans , animals , and the environment.

- Antimicrobial Resistant(AMR) is a complex issue of global concern.

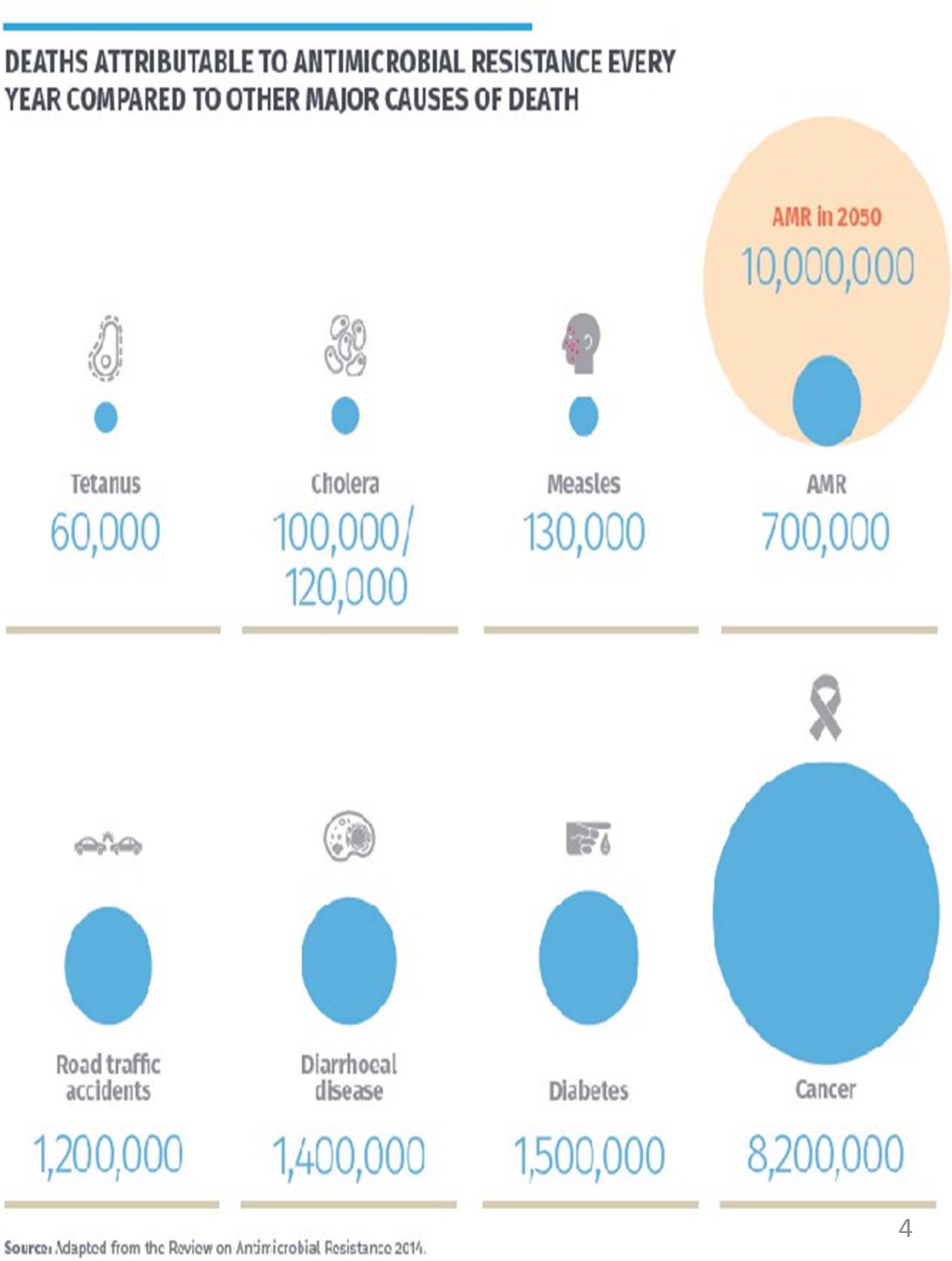
AMR was foreseen early

"The time may come when penicillin can be bought by anyone in the shops. Then there is the danger that the ignorant man may easily under dose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant"

Alexander Fleming, Nobel Lecture, December 1945

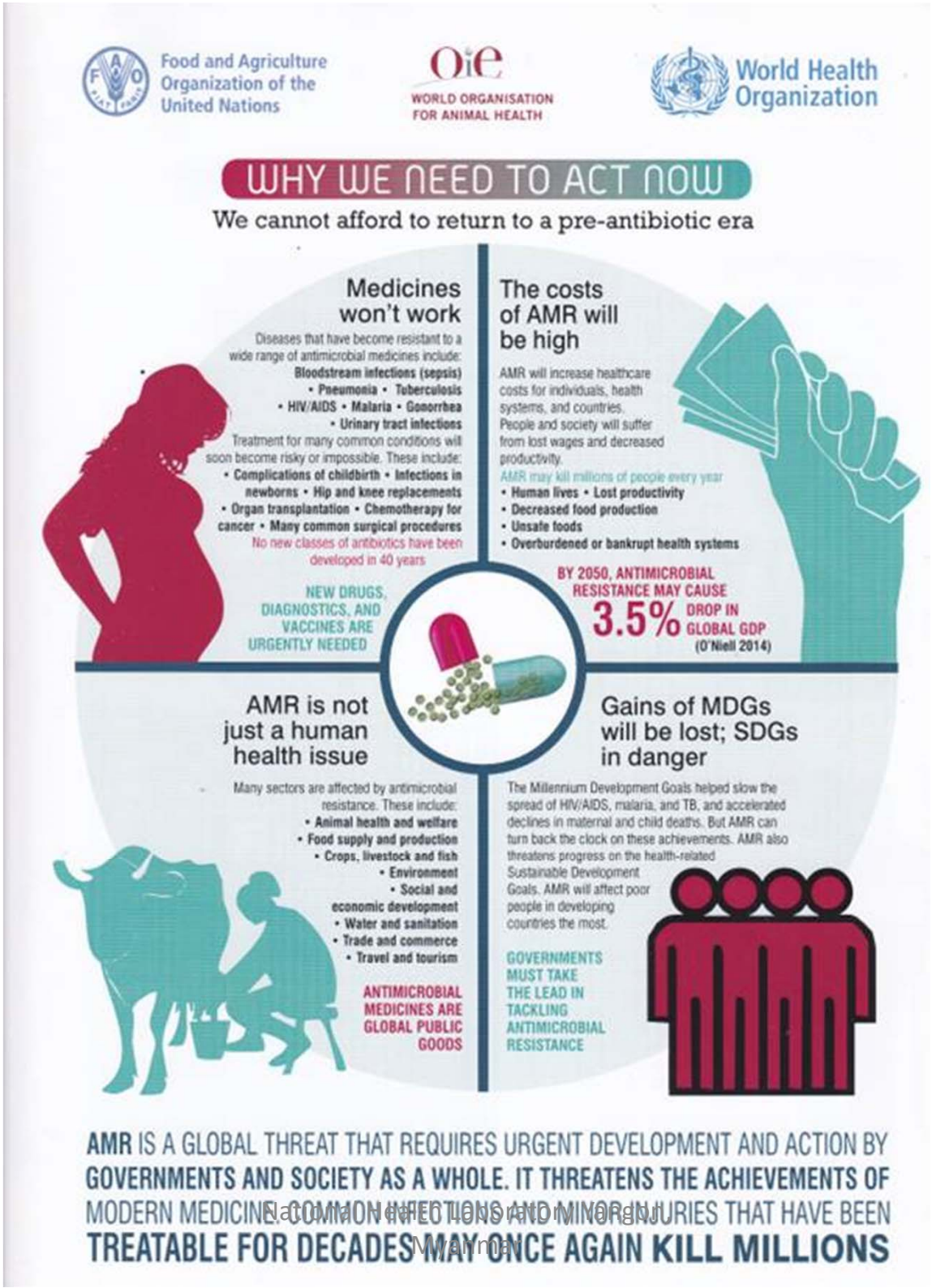


AMR is already a substantial killer and is only becoming bigger



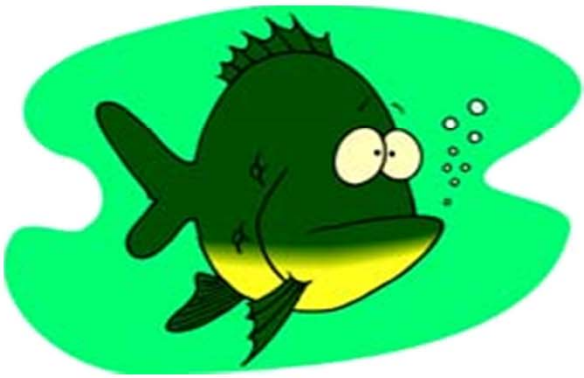
Human use

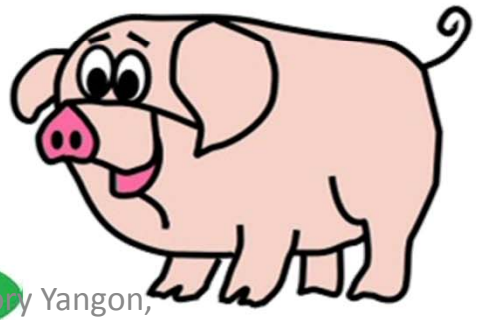
Use in Agriculture

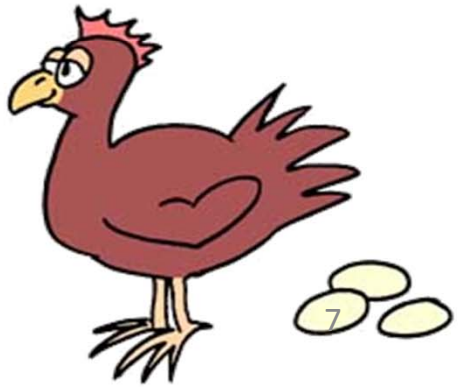

Food and Agriculture Organization of the United Nations
WORLD ORGANISATION FOR ANIMAL HEALTH
World Health Organization
WHY WE NEED TO ACT NOW
We cannot afford to return to a pre-antibiotic era
Medicines won't work
Diseases that have become resistant to a wide range of antimicrobial medicines include:
Bloodstream infections (sepsis) • Pneumonia • Tuberculosis • HIV/AIDS • Malaria • Gonorrhea • Urinary tract infections
Treatment for many common conditions will soon become risky or impossible. These include:
• Complications of childbirth • Infections in newborns • Hip and knee replacements • Organ transplantation • Chemotherapy for cancer • Many common surgical procedures
No new classes of antibiotics have been developed in 40 years
NEW DRUGS, DIAGNOSTICS, AND VACCINES ARE URGENTLY NEEDED
The costs of AMR will be high
AMR will increase healthcare costs for individuals, health systems, and countries.
People and society will suffer from lost wages and decreased productivity.
AMR may kill millions of people every year
• Human lives • Lost productivity • Decreased food production • Unsafe foods • Overburdened or bankrupt health systems
BY 2050, ANTIMICROBIAL RESISTANCE MAY CAUSE 3.5% DROP IN GLOBAL GDP (O'Niell 2014)
AMR is not just a human health issue
Many sectors are affected by antimicrobial resistance. These include:
• Animal health and welfare • Food supply and production • Crops, livestock and fish • Environment • Social and economic development • Water and sanitation • Trade and commerce • Travel and tourism
ANTIMICROBIAL MEDICINES ARE GLOBAL PUBLIC GOODS
Gains of MDGs will be lost; SDGs in danger
The Millennium Development Goals helped slow the spread of HIV/AIDS, malaria, and TB, and accelerated declines in maternal and child deaths. But AMR can turn back the clock on these achievements. AMR also threatens progress on the health-related Sustainable Development Goals. AMR will affect poor people in developing countries the most.
GOVERNMENTS MUST TAKE THE LEAD IN TACKLING ANTIMICROBIAL RESISTANCE
AMR IS A GLOBAL THREAT THAT REQUIRES URGENT DEVELOPMENT AND ACTION BY GOVERNMENTS AND SOCIETY AS A WHOLE. IT THREATENS THE ACHIEVEMENTS OF MODERN MEDICINE. COMMON INFECTIONS AND MINOR INJURIES THAT HAVE BEEN TREATABLE FOR DECADES MAY ONCE AGAIN KILL MILLIONS

Widely used Antibiotics in Agriculture

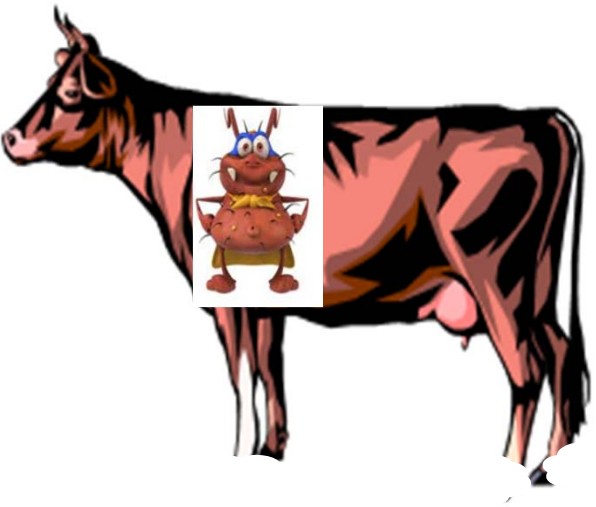
- Fruits, vegetables, grains
- Animal husbandry
- Farms
- Aquaculture
- Environment

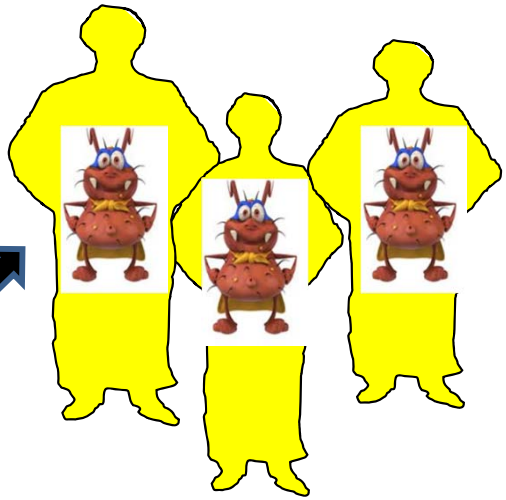


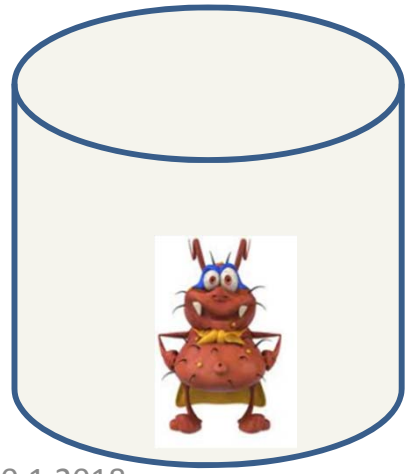


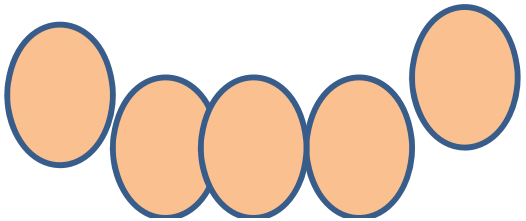


Transmission of antibiotic resistance bacteria





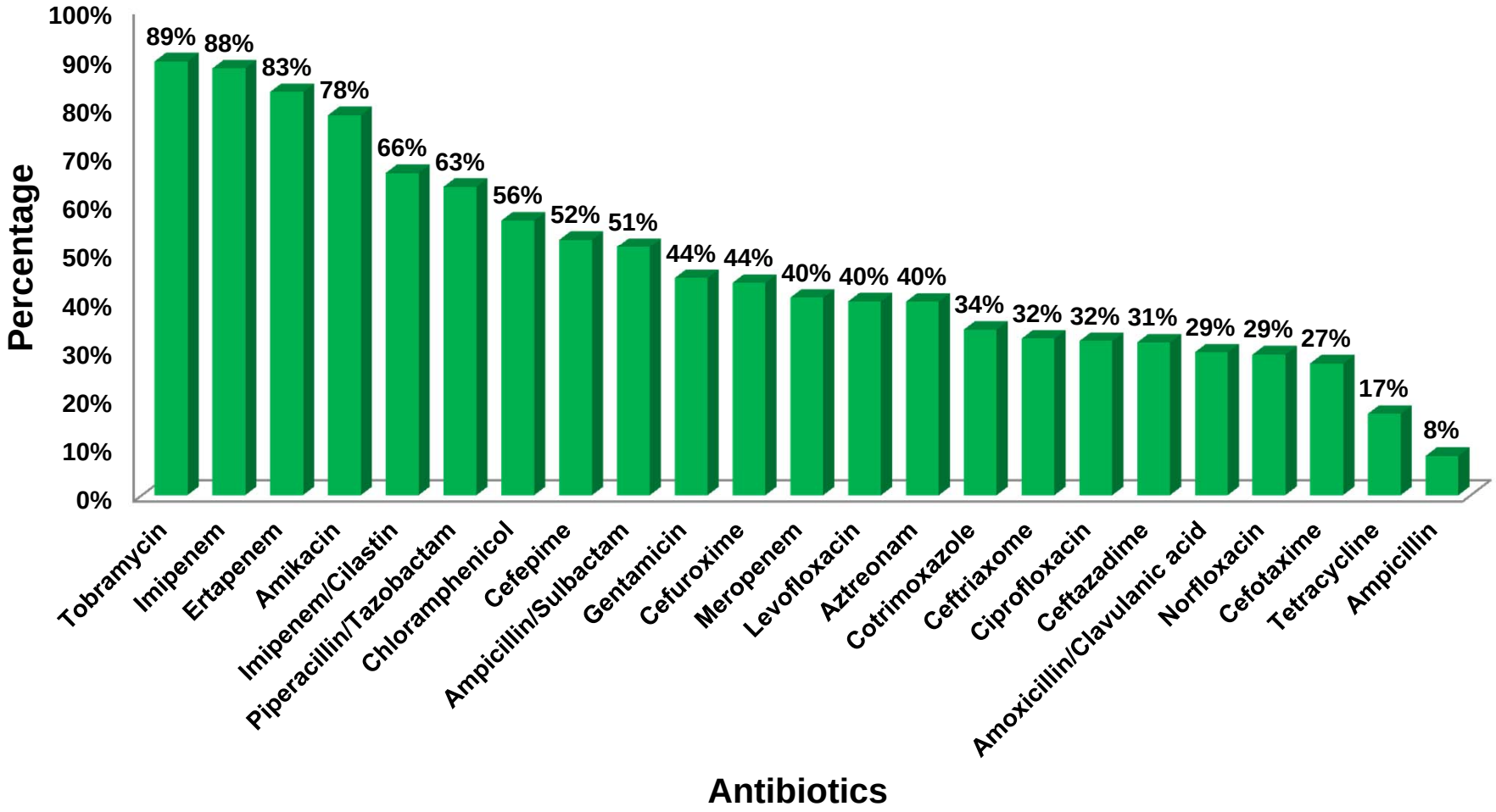




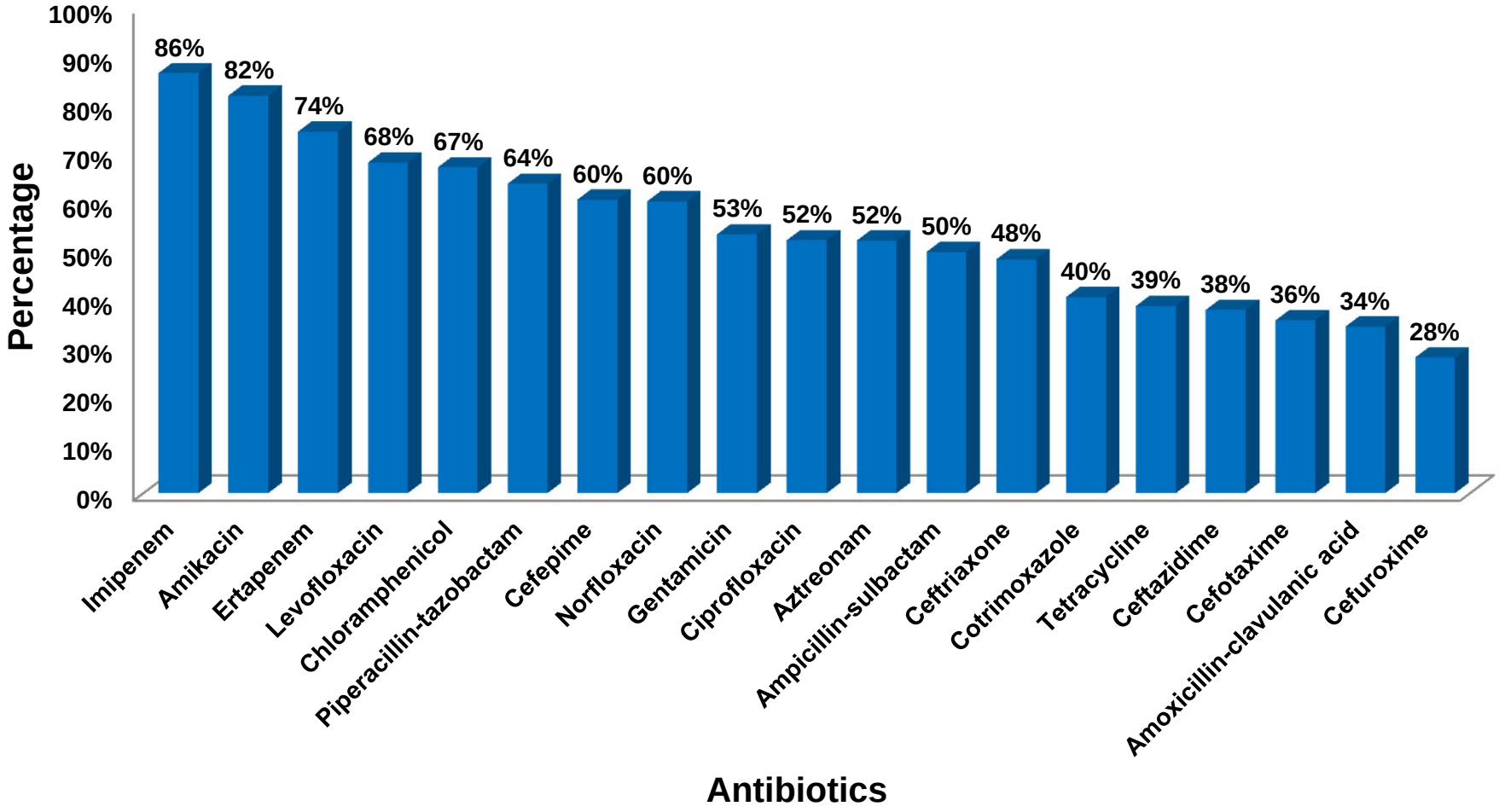
Common Bacteria associated with (HAI) Hospital Acquired Infections : **WHO High Priority Pathogens**

- *Staphylococcus aureus*
- *Pseudomonas aeruginosa*
- *Acinetobacter* species
- *Escherichia coli*
- *Klebsiella* species

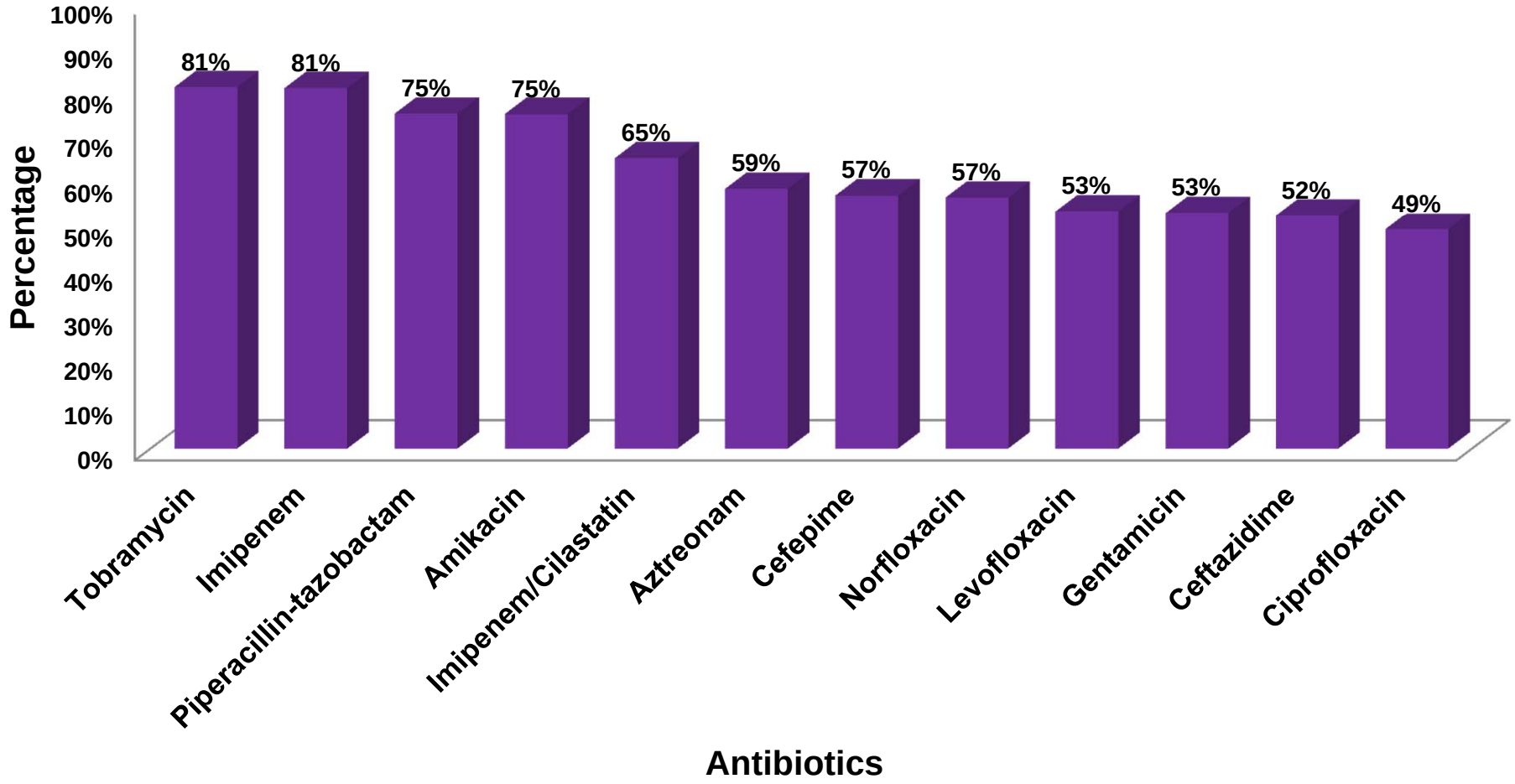
Antibiotic susceptibility patterns of *Escherichia coli* in Myanmar (2016)



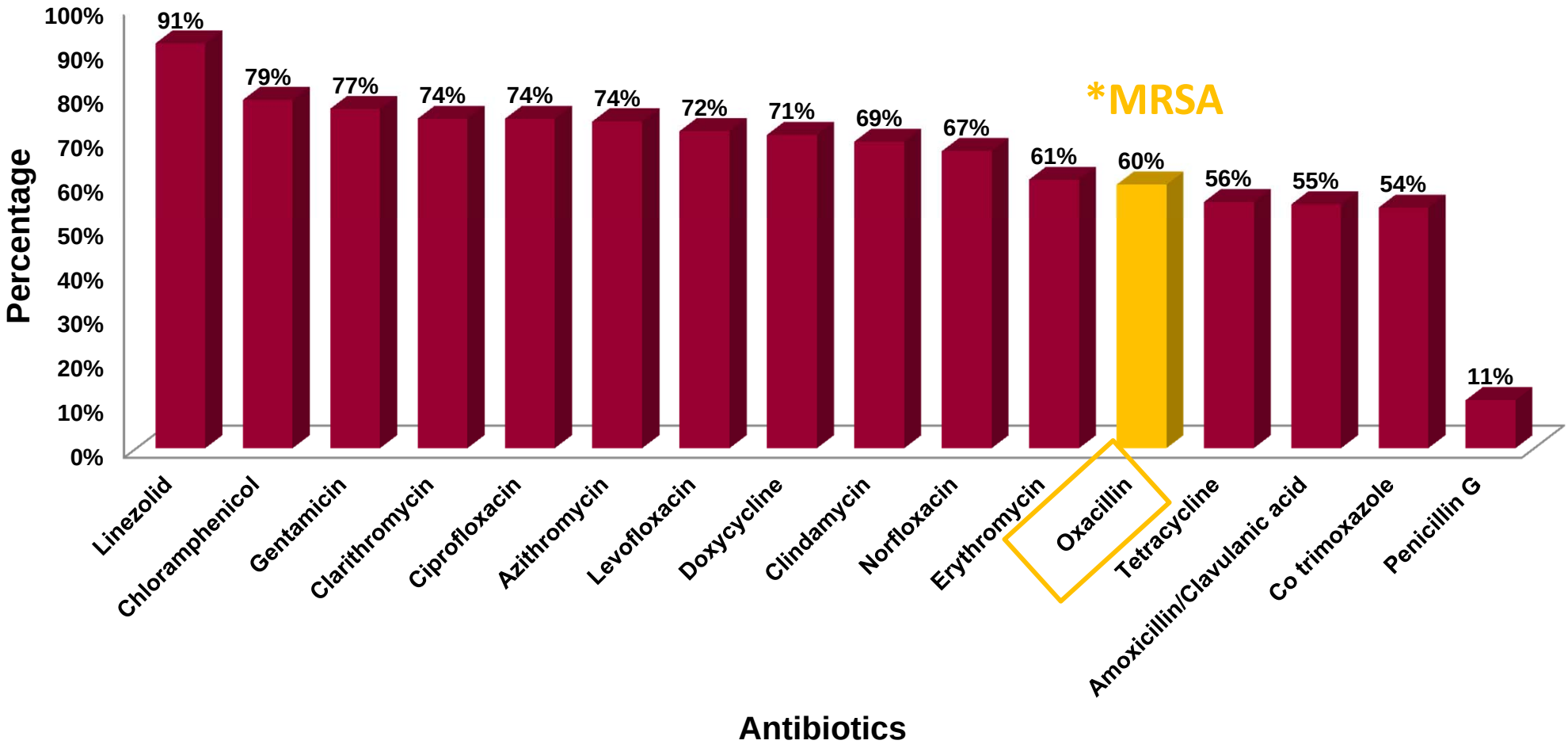
Antibiotic susceptibility patterns of *Klebsiella* species in Myanmar (2016)



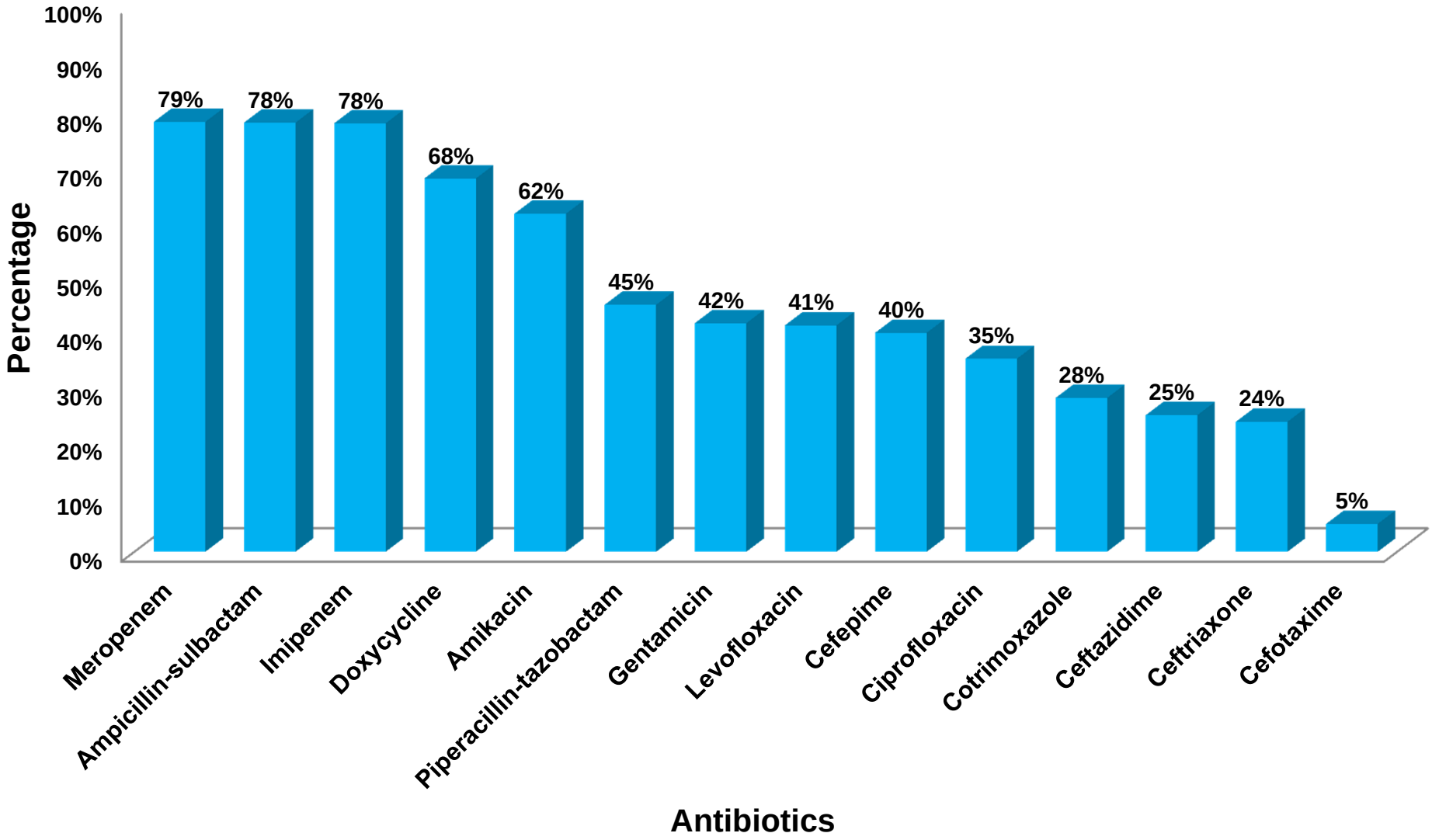
Antibiotic susceptibility patterns of *Pseudomonas aeruginosa* in Myanmar (2016)



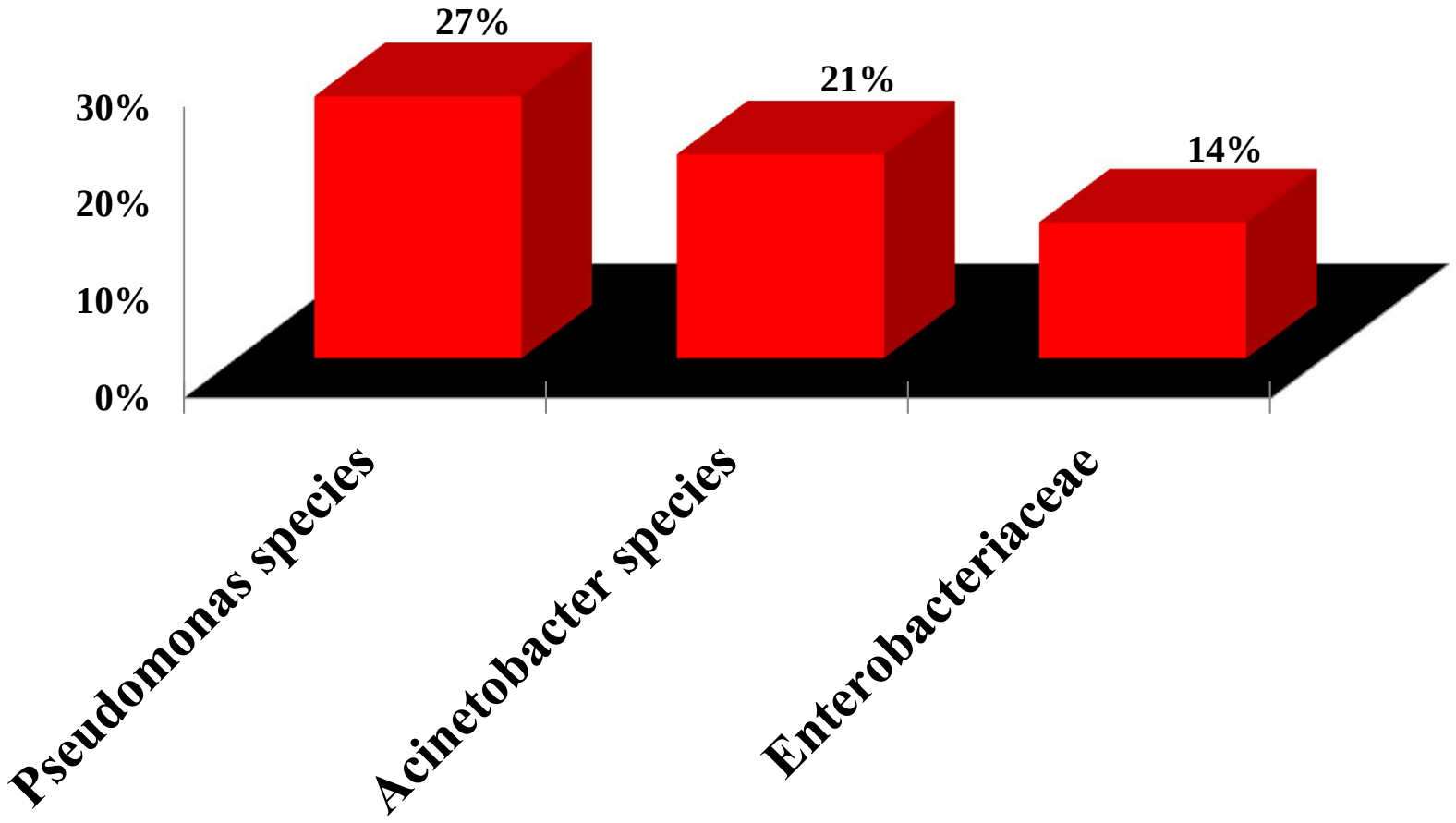
Antibiotic susceptibility patterns of *Staphylococcus* species in Myanmar (2016)



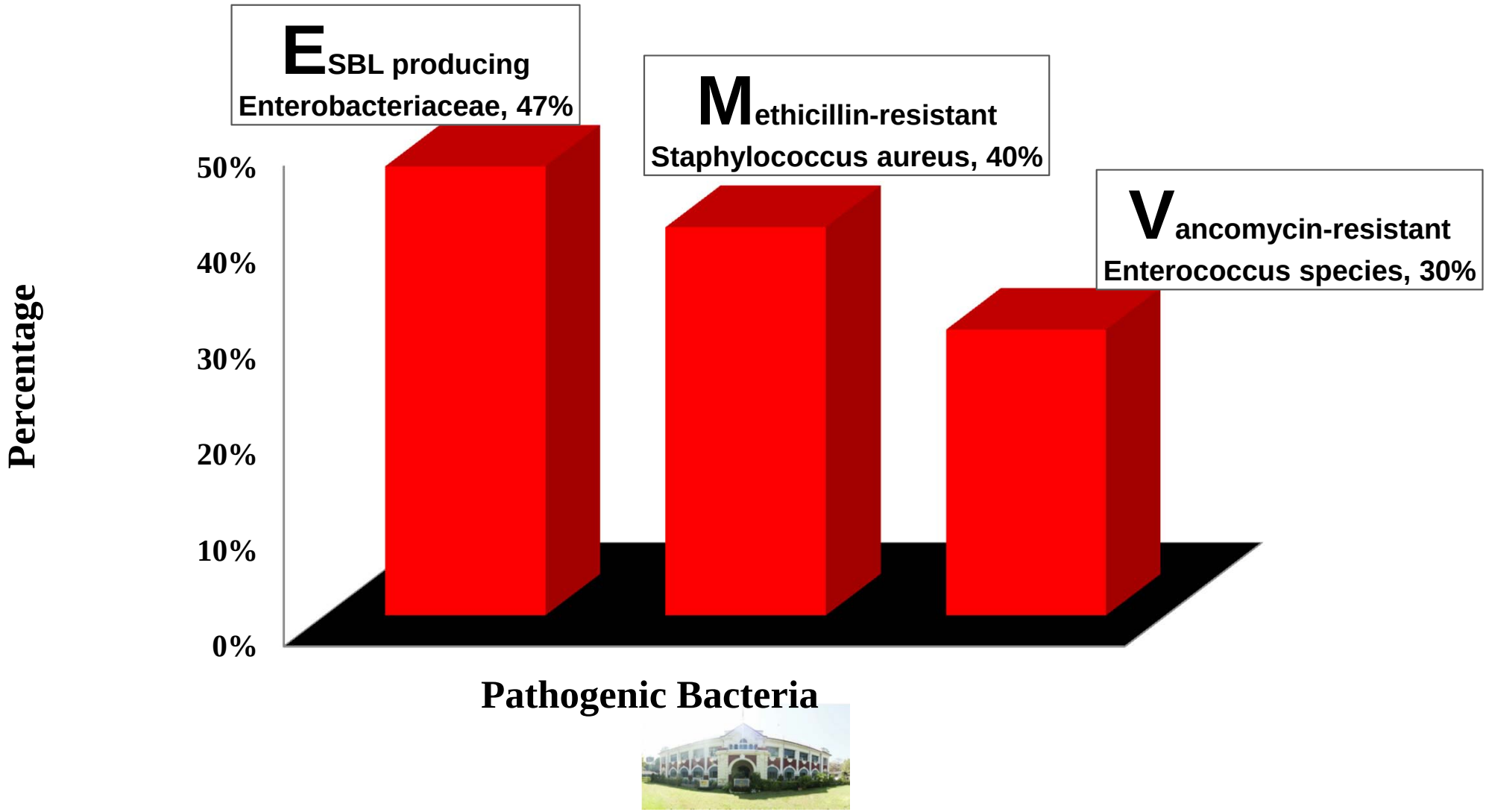
Antibiotic susceptibility patterns of *Acinetobacter* species in Myanmar (2016)



WHO Critical Priority Pathogens in Myanmar (Carbapenem-resistant Bacteria) (2016)



WHO High Priority Pathogens in Myanmar (ESBL producing Enterobacteriaceae, VRE and MRSA)(2016)



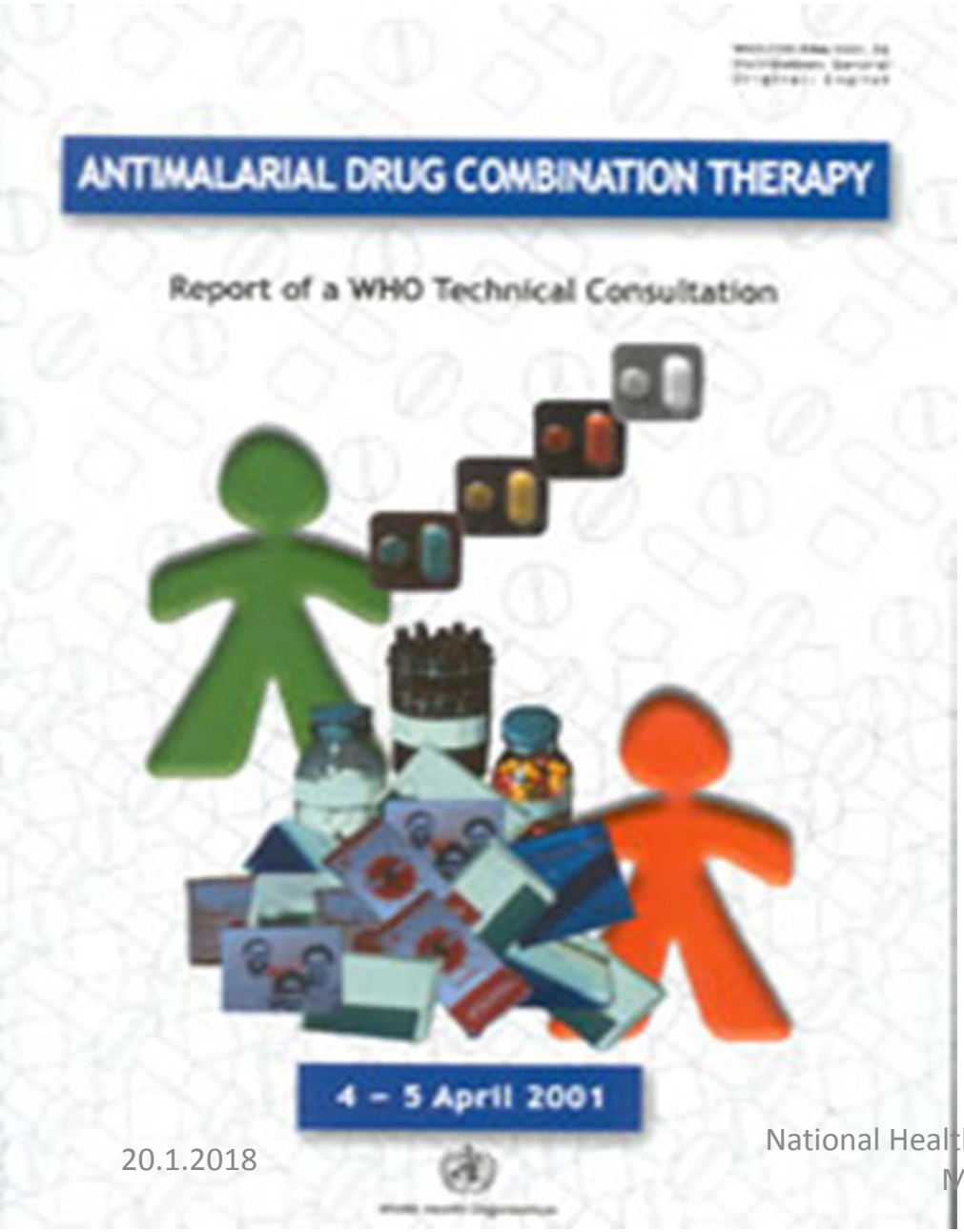
in countries with high prevalence of TB, especially multi-resistant strains, (MDR-TB & XDR-TB) transmission in health care settings may be an important problem

Drug Resistance and HIV

HIV…

- **Evolves rapidly within human body**
- **Has a high replication rate**
- **Has a high mutation rate**
- **Resistant strains can emerge within days if drug pressure is not sufficient to suppress replication**
- **Resistant strains persist indefinitely**
- **Can re-emerge if same drugs are stopped and restarted**

Rational Antimalarial Drug Selection

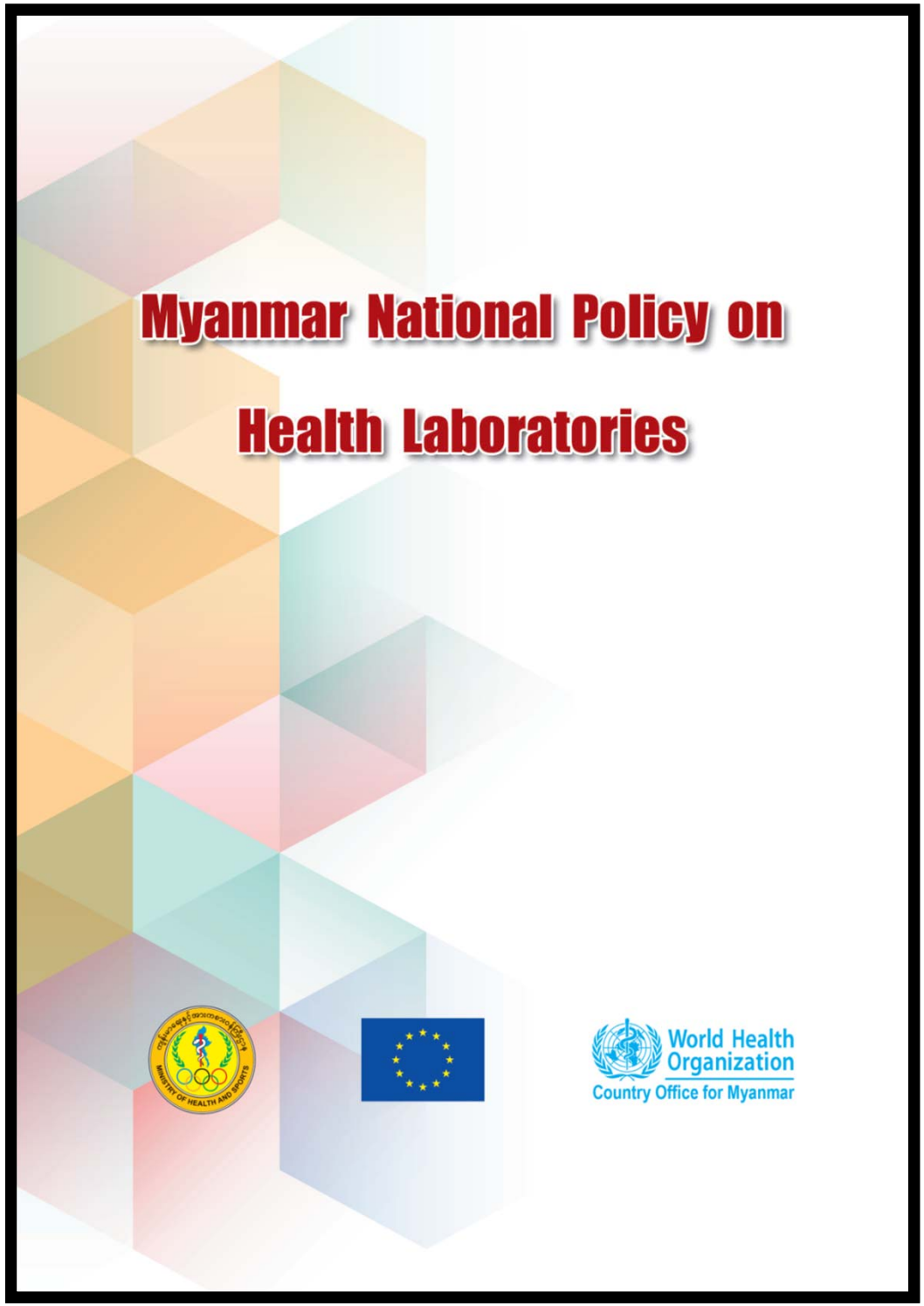


- Myanmar National Policy on Health Laboratories had been disseminated in September, 2016

- Development of National Strategic plan for Health Laboratories : NSPHL (2017-2022) was adopted in line with National Policy on Health Laboratories

- National surveillance for AMR is highly listed in NSPHL

- National Action Plan : NAP for AMR was endorsed in endorsed in July. 2017 according to GLASS.


Myanmar National Policy on
Health Laboratories
World Health Organization
Country Office for Myanmar

DRAFT

National Strategic Plan for Health Laboratories

Myanmar

2017-2022

2016, June


PARKROYAL Yangon
World Health Organization
Stakeholders Meeting on AMR National Action Plan, Myanmar
27 February 2017

National Action Plan for Containment of Antimicrobial Resistance: Myanmar

2017-2022

July, 2017

Version 01

Priority Areas

Improving awareness and understanding of AMR

- Increase awareness of the use of antimicrobials in humans, animals, and agriculture through effective communication, education and training
- Encourage best practices among the general public, health workers, and policy makers
- Promote wide-scale advocacy and education initiatives

Strengthening surveillance in human health, animal health and agriculture sectors

- Monitor resistance in microorganisms
- Monitor use of antimicrobials
- Monitor disease and economic burden due to resistant organisms

Strengthening infection prevention and control (IPC) practices in healthcare facilities

- Strengthen disease control programmes
- Augment infection-control practices in hospitals
- Promote infection control practices in communities
- Promote and strengthen disease prevention interventions

Promoting rational use of antimicrobials across sectors

- Promote optimal prescription
- Make quality laboratory data available in real time
- Rationalize use in veterinary sector
- Promote compliance and proper public use

Promoting investments in AMR and related research

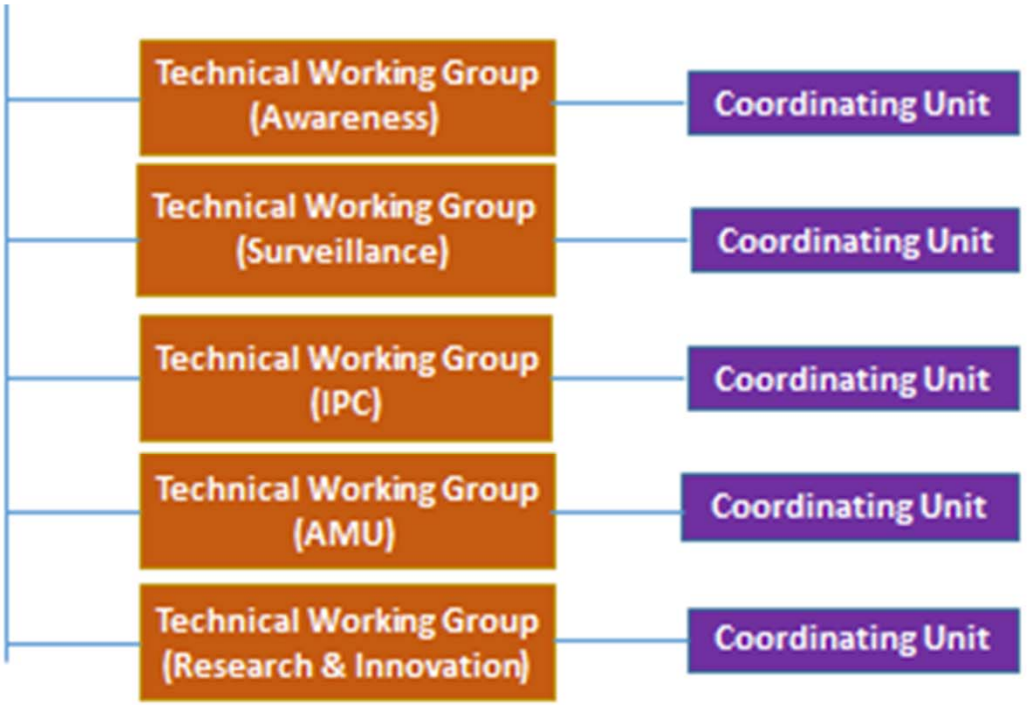
- Encourage basic research
- Support operational research
- Support the development of new antimicrobial agents and vaccines

World Health Organization
Regional Office for South-East Asia

NAP,AMR Governance Structure in Myanmar

NAP,AMR Governance Structure in Myanmar

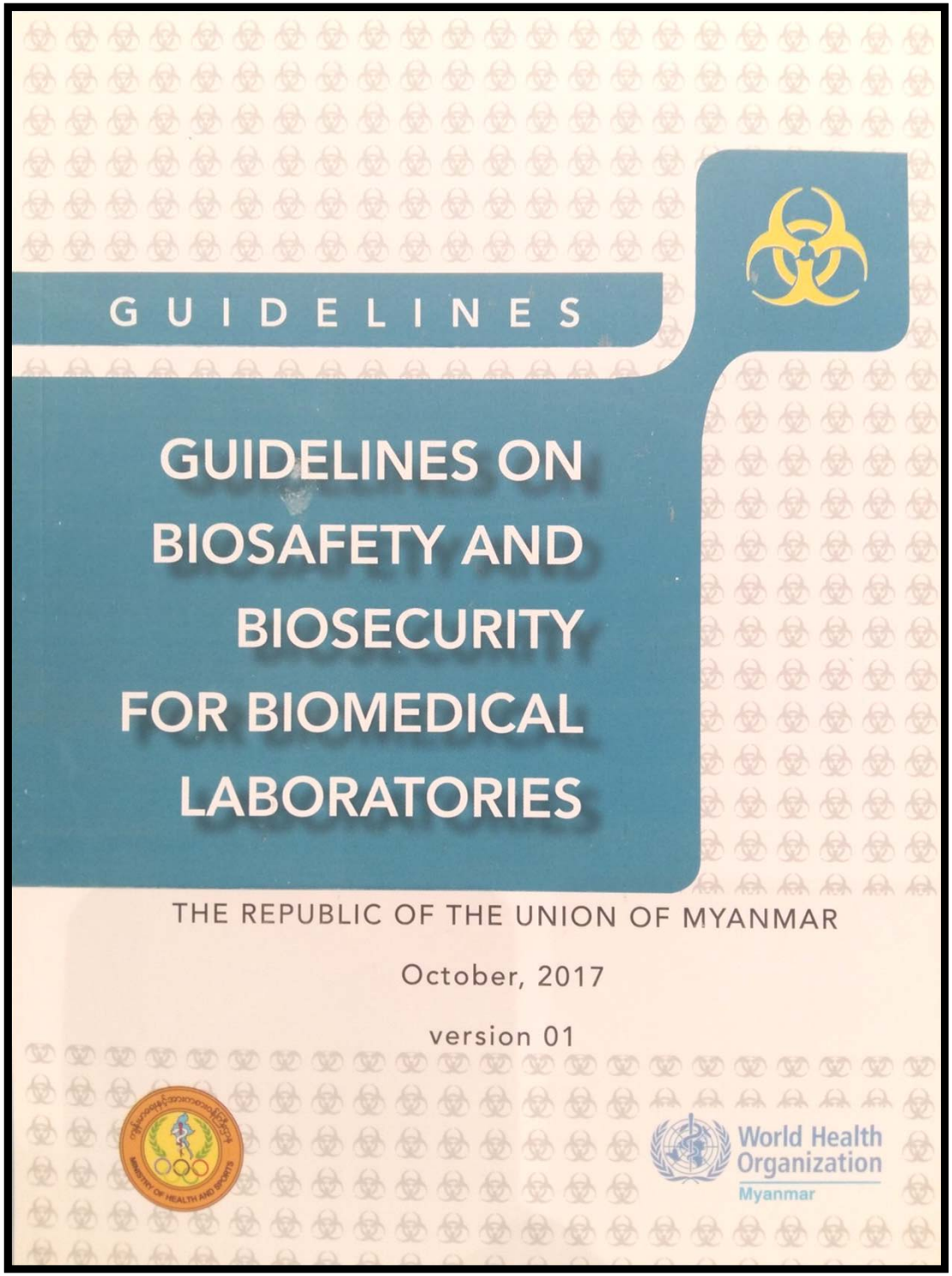
- TWGs will be mulit-sectoral groups with representatives from different ministries.
- TWGs will be responsible for implementation of NAP through specialized coordinating units and if needed, specialized task forces.

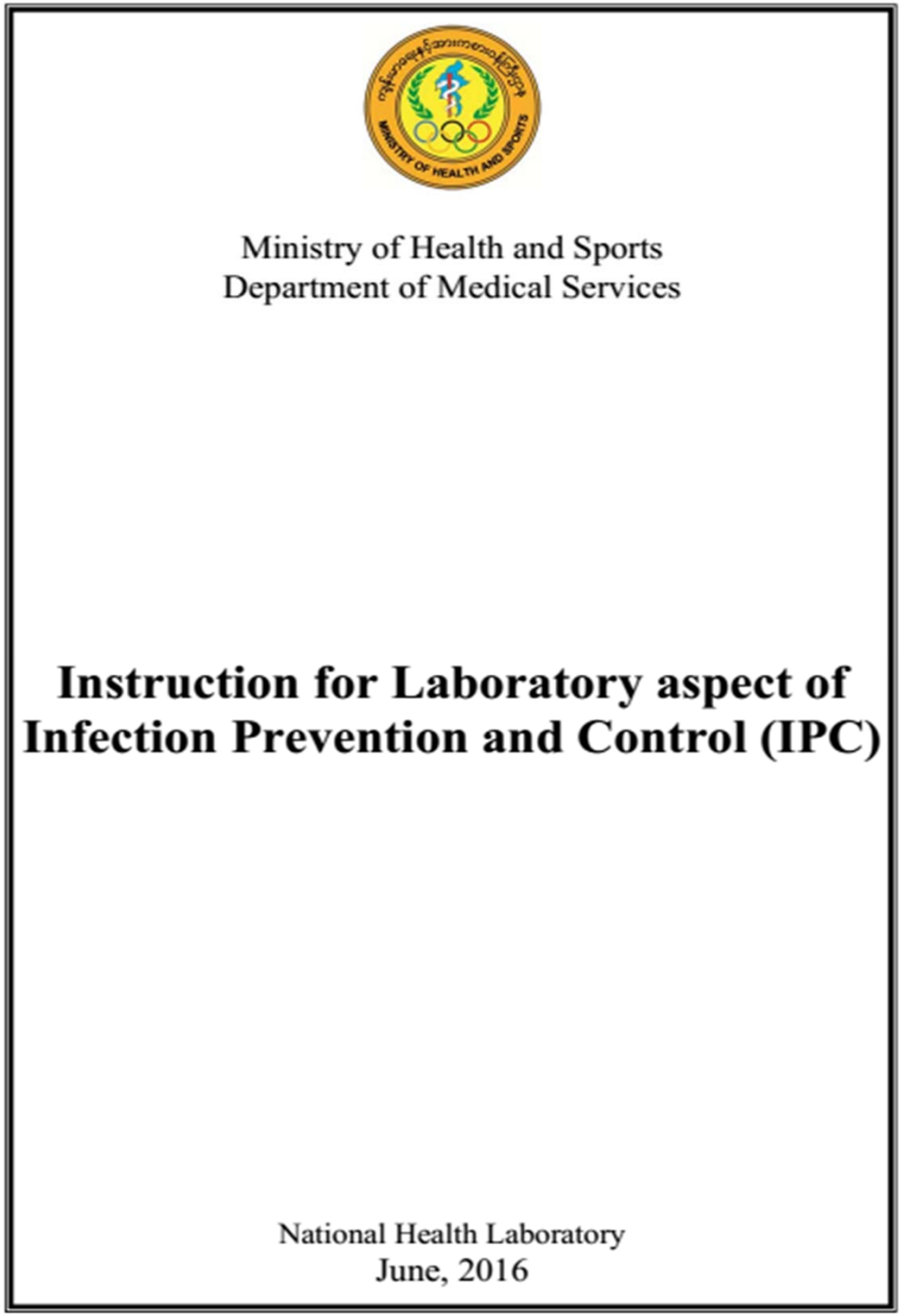


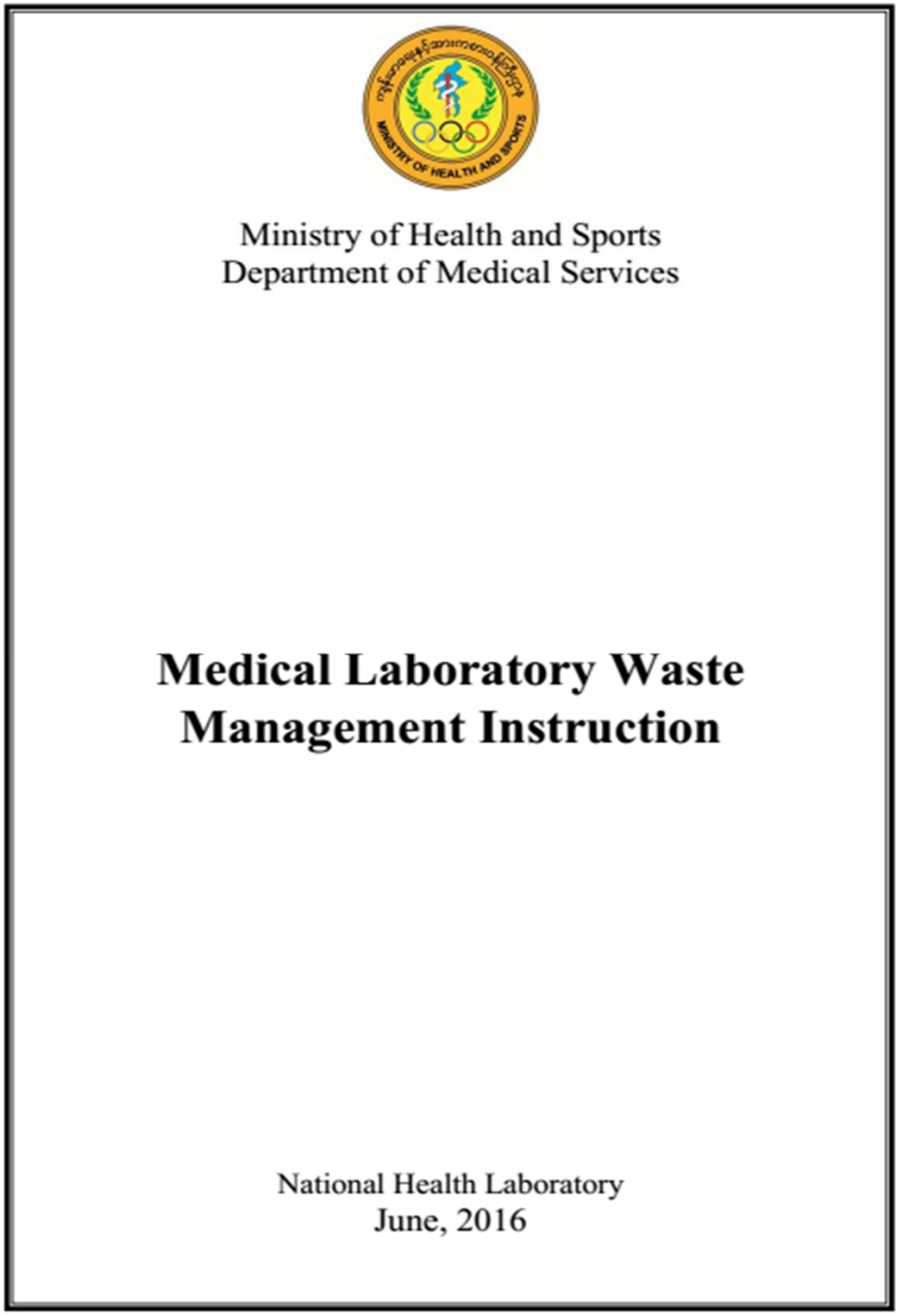
- In specific situations, TWGs will commission task forces that will work under their representative technical guidance and supervision.
- Will comprise of in-country and international experts, including those from WHO/FAO/OIE.
- Will task with specific functions such as evaluation of existing policies, frameworks, interventions and guidelines and the development of guidelines and standards.

Role of NHL for AMR

- **NEQAS** – Identification and Antibiotic Sensitivity Testing of Bacteria, (37) Central, Teaching, States, Regional and some District Level Hospitals (2017)
- Participate in International EQAS, NIH, Thailand
- National Data collection from Hospitals and support to SOPs, Guidelines
- Workshops on AMR (WHO)- Standard Laboratory Method and Management of Data Entry (WHONET training)
- Collaboration with National Centre for Global Health and Medicine (NCGM), Japan on their Whole Genome Sequencing (2015-2017)
- Standing as Reference Laboratory for AMR


GUIDELINES
GUIDELINES ON BIOSAFETY AND BIOSECURITY FOR BIOMEDICAL LABORATORIES
THE REPUBLIC OF THE UNION OF MYANMAR
October, 2017
version 01
World Health Organization
Myanmar


Ministry of Health and Sports
Department of Medical Services
Instruction for Laboratory aspect of Infection Prevention and Control (IPC)
National Health Laboratory
June, 2016


Ministry of Health and Sports
Department of Medical Services
Medical Laboratory Waste Management Instruction
National Health Laboratory
June, 2016

AMR in Joint External Evaluation(JEE)

- Raise awareness among the general public on AMR and among health care workers in human and animal health sectors on surveillance, prudent use of antimicrobials and the important of good practices

- Increase laboratory capacity on AMR, both in the human and animal health sector and share AMR data across the sectors

- Cooperate in a One Health approach between sectors at local, regional and national levels on AMR

One health approach(JEE Assessment)

P.3. Antimicrobial resistance

P.3.1 Antimicrobial resistance detection	3
P.3.2 Surveillance of infections caused by antimicrobial-resistant pathogen	3
P.3.3 Health care associated infection (HCAI) prevention and control programs	1
P.3.4 Antimicrobial stewardship activities	1

Activities of World Antibiotic Awareness Week
Nay Pyi Taw
23.11.2017

Activities of World Antibiotic Awareness Week 23.11.2017

Activities of World Antibiotic Awareness Week 23.11.2017

Challenges

Limited Laboratory Capacity for AMR

Human resource

- Skill and training regarding clinical microbiology laboratory for Microbiologists and technicians, staff rotation
- Staff motivation

Machines, Materials & Instruments for C&S

- Conventional C& S
- Automated – Vitek2, Bact Alert (FOC ?/Budget ?)
- Limited number of Biosafety Safety Cabinet

- **Budget for full laboratory capacity support??**

Challenges

Communication

- Communication between clinicians and the laboratory persons in consulting antibiotic resistance pattern of various samples

- **Limited use of antibiogram result by clinician**

- Clinical notes & diagnosis on request form.. Inadequate
- Unaffordable LIS Laboratory Information system effectively
- Data storage and Reporting- Limited IT facilities and internet access in some labs **(WHONET data analysis)**

Challenges

Sample Collection & Transportation.. Quality and timely transportation of sample are critical considerations to get qualified AMR results.

- Space- Not enough working space

- Storage- Not enough lab equipments like refrigerator, deep freezer etc in some labs for samples storage

- **Less awareness about the laboratory / health care associated infection , partly effected by their heavy workload and duties**

- **Waste disposal**

  -Difficult to get uniform colour coated plastic bag and waste container according to biosafety guideline / autoclavable bag

Challenges

- **Limited use of antibiotic guidelines and antibiotic policy in some hospitals**
- Monthly CME and 3 monthly meeting in some hospitals but no regular meeting in some hospitals
- Less functional hospital Infection control committee meeting – **annually/twice per year/Quarterly**
- **Unlimited access to laboratory working area**
- **Antibiotic Stewardship Program -not started yet in many hospitals**
- Coordination between area of human and animal health based on one health approach

Future Works To Be Done

- National AMR Surveillance
- National Laboratory Network Strengthening
- Early Warning System for emerging drug resistance trends
- Strengthening of IPC and AMR Stewardship Programme in Healthcare Setting
- Surveillance of rational antimicrobial use
- WHONET platform will be implemented for epidemiological and laboratory AMR surveillance data entry, storage and transmission in human and animal sector labs
- Establish a systematic, standardized process to collect, assess and share data, maps and trends on AMR hazards

Future Work To Be Done

- Promoting establishment of One health surveillance
- Cooperate AMR knowledge in undergraduate and post graduate medical , nursing and basic health teaching curriculum
- Surveillance or monitoring programs for antimicrobial resistant bacteria and antimicrobial use for humans and animals
- To establish qualified laboratory systems including human resources and laboratory capacity on AMR and develop national data collection systems.
- To strengthen coordination between human and animal sectors
- Policy or activities on AMR , it is highly effective to share progress and provide constructive feedback within the region, in collaboration with international organizations.

National External Quality Assessment for Identification and Antimicrobial Susceptibility Testing of Bacteria (2016)

➢Panel Distribution

2 times/ year

Panel #140 (March, 2016)

Panel #143 (Aug, 2016)

Participating Laboratories

➢Total 32 Public Laboratories(NHL, Mandalay PHL and 30 Hospital Laboratories)

Distributed Panels

	# 140 (March, 2016)	#143 (Aug, 2016)
Species	Morganella morganii	Burkholderia cepacia
Antimicrobial susceptibility	Ampicillin (R), Norfloxacin (R), Ceftriaxone (S), Cotrimoxazole (R), Gentamycin (S)	Ampicillin(R),Amoxicillin/clavulanate(R), Cefotaxime (S), Cotrimoxazole (S), Gentamycin (R)

Scoring Frequency for Identification of Bacteria of Participating Laboratories

#140			#143		
Species	**Score**	**No. of Labo.**	**Species**	**Score**	**No. of Labo.**
Morganella morganii	3	19 (59.4%)	**Burkholderia cepacia**	3	21 (65.6%)
Morganella species	2	0 (0%)	**Burkholderia species**	2	1 (3.1%)
Gram-negative bacilli	1	13 (40.6%)	**Gram-negative bacilli**	1	7 (21.9%)
Wrong/ No answer	0	0 (0%)	**Wrong/ No answer**	0	3 (9.4%)

Accuracy Rate of Susceptibility for Each Antimicrobial Drug

#140			#143		
Susceptibility Test	Type result	Correct Answer	Susceptibility Test	Type result	Correct Answer
Norfloxacin	R	29(91%)	Cefotaxime	S	27(84%)
Gentamycin	S	28(88%)	Cotrimoxazole	S	27(84%)
Ampicillin	R	30(94%)	Amoxicillin-clavulanic acid	R	25(78%)
Ceftriaone	S	30(94%)	Gentamycin	R	25(78%)
Cotrimoxazole	R	29(91%)	Ampicillin	R	26(81%)

Conclusion

- Strengthening of laboratory capacity for identification and antibiotic susceptibility testing of bacteria is crucial
- Poor performance in lab NEQAS –Urgent remedial action including follow up visits to participating laboratories
- Technical assistance by NHL – Provide pre-service training, Refresher training , Individual training etc.
- Expansion of NEQAS to cover more public hospitals and public hospitals


Thank You for your kind attention