

Antibiotic Resistance as a hidden global threat, urgent actions required

18-24 NOVEMBER

World Antimicrobial Awareness Week

World Antimicrobial Awareness Week (WAAW) is a global healthcare event focused on preventing the emergence, and spread of antibiotic resistance; and promoting best practises among the general public, health workers, and policymakers by raising awareness of the issue worldwide.



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Seminar outline:

- What are Antibiotics?
- Antibiotics were Miracle but not any more!
- What is antimicrobial resistance (AMR)?
- Key facts on AMR
- What is Antibigram?
- Steps to design the Antibigram program in Erbil.



What are antibiotics?

Antibiotics refer to substances produced by microorganisms that kill or slow down another microorganism.



- Penicillin was first antibiotic discovered by Alexander Fleming In 1928.

- In **1941** Flory and Chain used penicillin for the first patient.



Sir Alexander Fleming
Prize share: 1/3



Ernst Boris Chain
Prize share: 1/3



Sir Howard Walter
Florey
Prize share: 1/3

- Fleming, Chain, and Florey won Nobel Prize in **1945**.



Antibiotics were Miracle but not any more!!

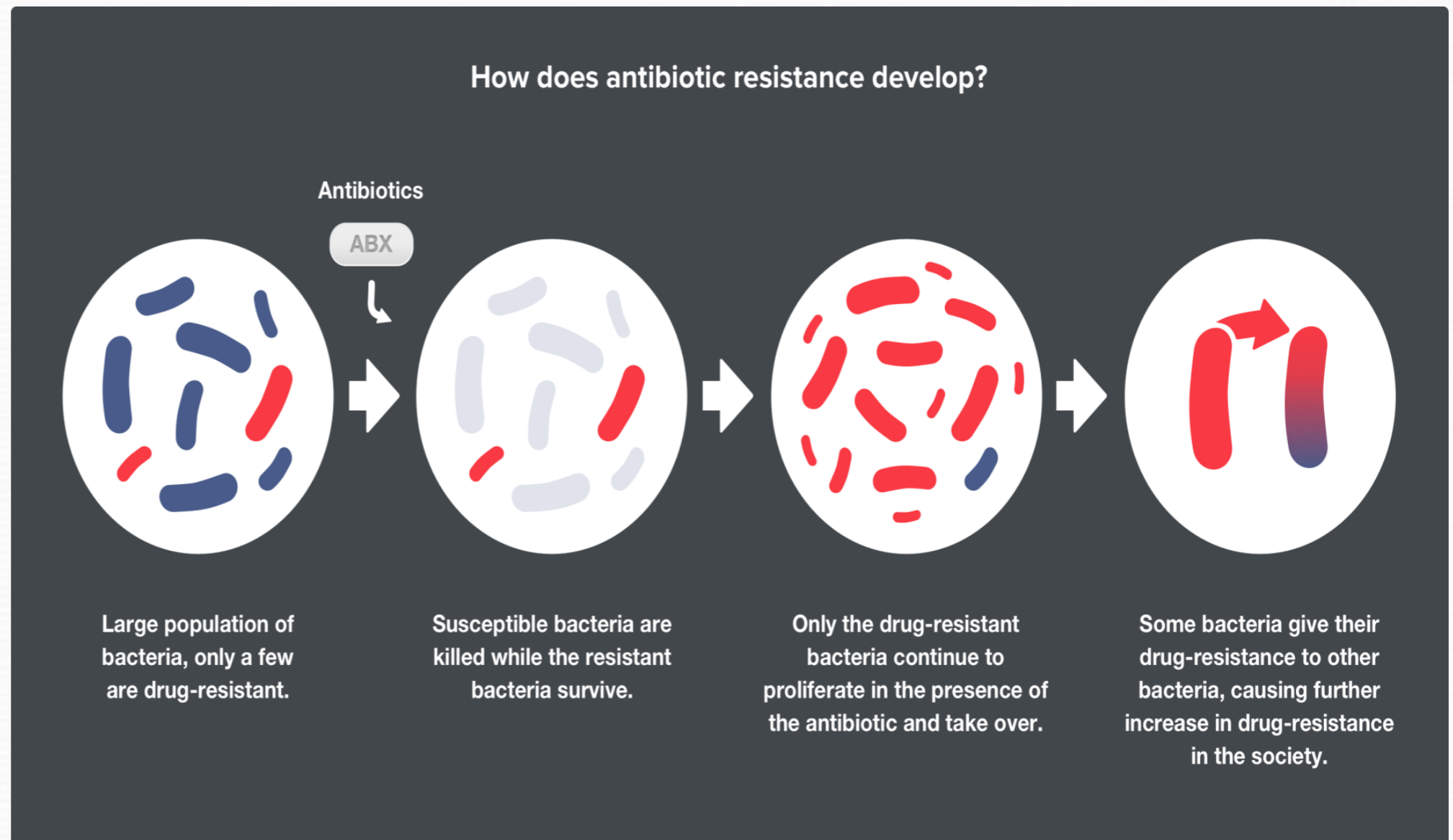
In WWI: Bacterial pneumonia death rate was 18 percent

In WWII, it fell, to less than 1 percent.

Penicillin saved 80.000. 000 to 200.000.000 lives.

What is antimicrobial resistance?

Antimicrobial resistance occurs when a drug is no longer effective against an infection. This can happen with all types of infections, such as bacterial, viral, fungal or parasitic.



Reasons for antimicrobial resistance?

1. Widespread and Improper use of antibiotics
2. Prolonged and grouping of colonized patients in hospitals.
3. Ineffective infection-control practices.
4. Antibiotic use in agriculture and farms.
5. Increasing national and international travel.

Antibiotic Resistance genes

Antibiotic resistance genes encoding for bacterial resistance to common antibiotics, including β -lactams, aminoglycosides, chloramphenicols, and tetracycline, are posing a major threat to current medical treatment of common diseases

ESKAPE pathogens.

Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, and Enterobacter spp

Key facts on AMR:

- AMR is one of the most complex global health challenges after climate change and pollution (CDC and WHO)
- About 2.8 million antibiotic-resistant infections occur in the U.S., and more than 35,000 people die in 2017, and over one million death cases in the world in 2019.
- Many more dying from conditions complicated by antibiotic resistant infections in developing countries where data are not available.
- The cost on Antimicrobial Resistance is \$55 billion in USA annually. With a projected cost of \$100 trillion and a death toll of 10 million annually by 2050 due to antibiotic resistance, – becoming a bigger killer than cancer is today.

CDC's Urgent Threats Report in 2017

Cases

Deaths

Carbapenem-resistant Acinetobacter
W, UTI and bloodstream



8,500

700

C. difficile
Life-threatening diarrhea and colitis



223,900

12,800

Carbapenem-resistant Enterobacteriales (CRE)
Some Enterobacteriales are resistant to nearly all antibiotics



13,100

1,100

CDC's Serious Threats Report in 2017	Cases	Deaths
<p>ESBL-producing <u>Enterobacterales</u> They can spread rapidly and cause or complicate infections in healthy people.</p>	197,400	9,100
<p><u>Enterococci</u> Serious infections, including bloodstream, surgical site, and UTI</p>	54,500	5,400
<p><u>P. aeruginosa</u> It can be particularly dangerous for patients with chronic lung diseases.</p>	32,600	2,700
<p><u>MRSA</u> can cause difficult-to-treat staph infections because of resistance to some antibiotics.</p>	323,700	10,600



10 million
deaths/year
by 2050?

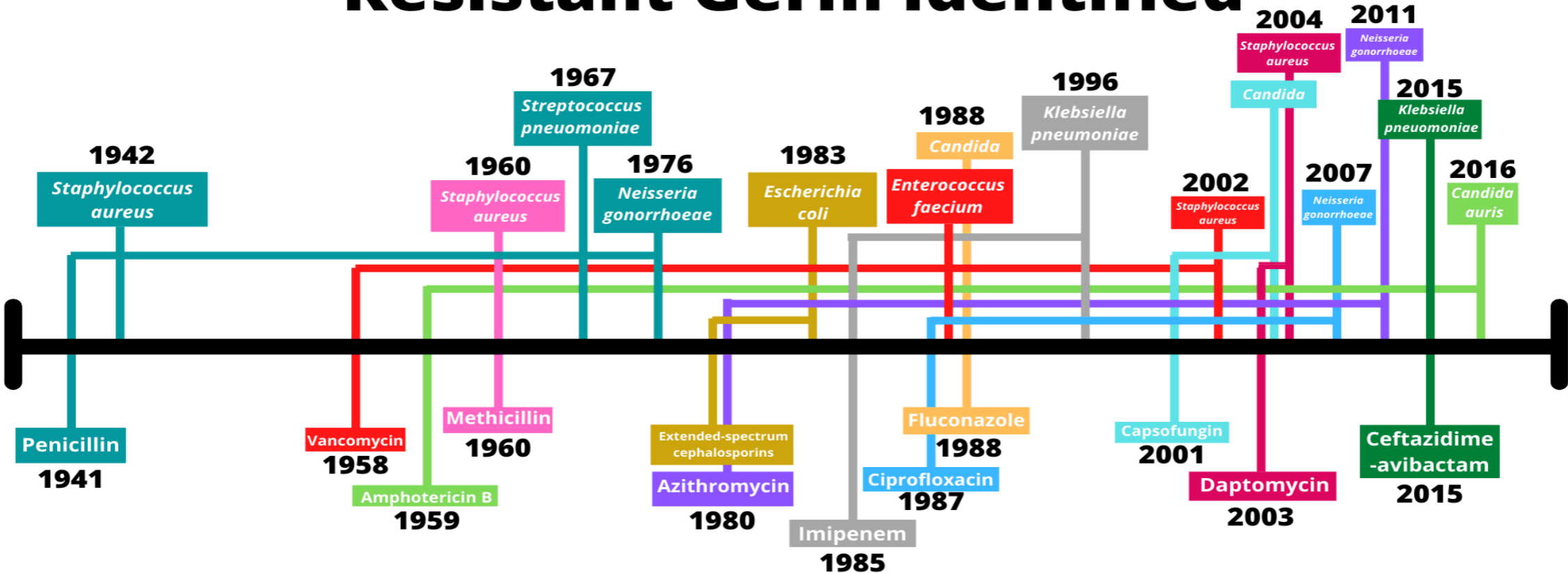
The game of resistance

For 70 years, scientists played a game -- drugs and their resistance, and then another drug, and then resistance again -- and now the game is ending. Bacteria develop resistance so quickly that pharmaceutical companies have decided making antibiotics is not in their best interest, so there are infections moving across the world for which, out of the more than 100 antibiotics available on the market, two drugs might work with side effects, or one drug, or none.

History of Antibiotic resistance

- Penicillin was discovered in 1941, and resistance arrived by 1942.
- Vancomycin arrived in 1958, vancomycin resistance in 1988.
- Imipenem in 1985, and resistance to in 1996.
- Daptomycin in 2003, and resistance to it just a year later in 2004.

Resistant Germ Identified



Antibiotic Approved or Released

KPC

RESISTANCE FACTOR

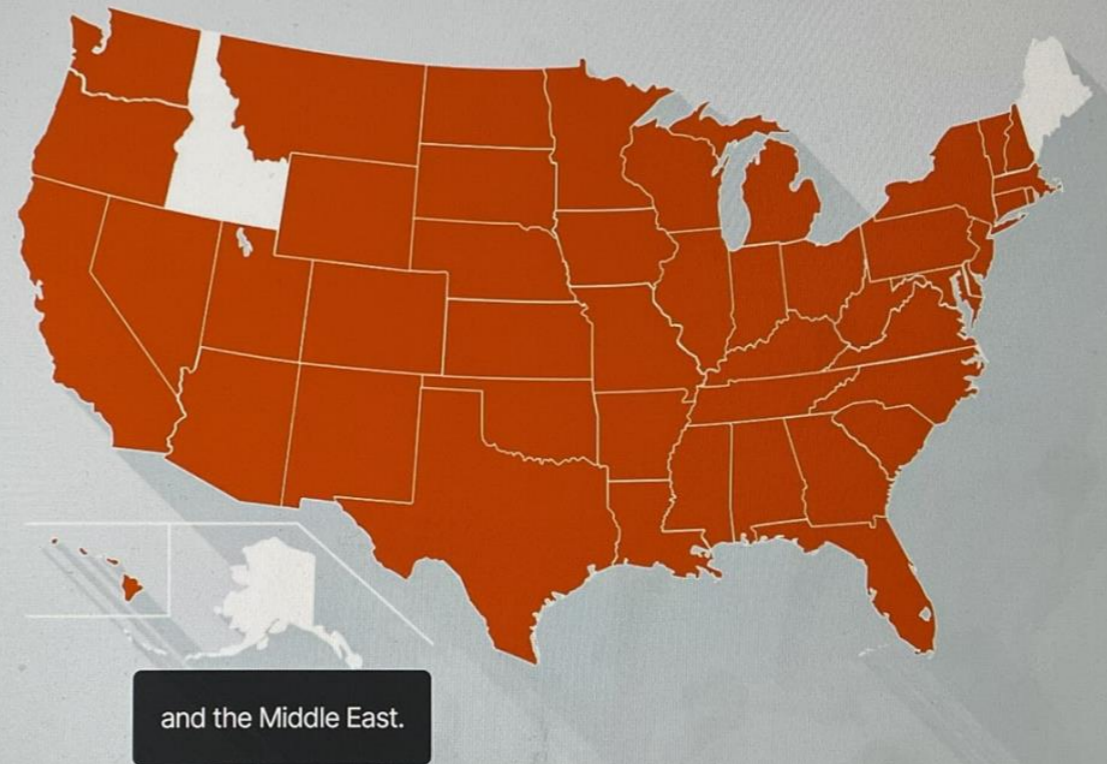
Identified in North Carolina in 2000 and has spread across the US.



KPC

RESISTANCE FACTOR

Identified in North Carolina in 2000 and has spread across the US.



In 2008, doctors in Sweden diagnosed a man from India with a different infection resistant to all but one drug that time. The gene that creates that resistance, known as New Delhi metallo- β -lactamase (**NDM**), has now spread from India into China, Asia, Africa, Europe and Canada, and the United States.

NDM

RESISTANCE FACTOR

Identified in India in 2008 and has spread across the globe.

known as NDM, has now spread from India into China, Asia, Africa,

NDM

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If we lose antibiotics, what else we would lose??

First, any protection for people with weakened immune systems -- **cancer patients, AIDS patients, transplant recipients, premature babies.**

Second, we'd probably lose surgery, any operations are preceded by prophylactic doses of antibiotics. Without that protection, we'd lose the ability to open the hidden spaces of the body.

So no heart operations, no prostate biopsies, no Cesarean sections.

How did we get to this point?

- Penicillin was sold over the counter until the 1950s. In much of the developing world, most antibiotics still are.
- They've also been used rather imprudently, 50 percent of the antibiotics given in hospitals are unnecessary.
- They've also been used in large quantities sub-therapeutically.
- World widely, 80 percent of the antibiotics sold every year used in poultry farms on animals, not for treatment, not for sick animals, but primarily for growth promotion.

Prevention and control

- **Individuals**
- **Policy makers**
- **Health professionals**
- **Healthcare industry**
- **Agriculture sector**

Prevention and control

Individuals

- Only use antibiotics when prescribed by a certified health professional.
- Never demand antibiotics
- Always follow your health worker's advice
- Never share or use leftover antibiotics.

Policy makers can:

- Ensure a robust national action plan to tackle antibiotic resistance is in place (Antibiogram)
- Improve implementation of infection prevention and control measures.
- Regulate and promote the appropriate use and disposal of quality medicines.

Health professionals can:

- Prevent infections by ensuring your hands, instruments, and environment are clean.
- Only prescribe antibiotics when they are needed, according to current guidelines.
- Report antibiotic-resistant infections to surveillance teams.
- Talk to your patients about how to take antibiotics correctly
- Talk to your patients about preventing infections

Healthcare industry can:

- Invest in research and development of new antibiotics, vaccines, diagnostics and other tools.

Agriculture sector can:

- Only give antibiotics to animals under veterinary supervision.
- Never use antibiotics for growth promotion
- Vaccinate animals to reduce the need for antibiotics
- Promote and apply good practices at all steps of production
- Improve biosecurity on farms and prevent infections through improved hygiene and animal welfare.

What is Antibiogram?

An antibiogram is a summary report of antimicrobial susceptibility testing data from patients, which can provide valuable information for healthcare and for public health. It is an essential resource for institutions to track changes in antimicrobial resistance and to guide empirical antimicrobial therapy

What is Antibiogram?

Antibiograms show the percentage of bacteria from an institution that are susceptible to the antibiotics normally used to treat them. These reports, which are typically produced annually, can show trends in antibiotic resistance within a healthcare facility or geographic region.

The idea of Establishing Antibioqram in Kurdistan

The idea of this program started in Oct. 2019 in a seminar presented by Dr. Petr from Czech Republic, after several meetings at our college and Rizgary Hospital, we started to plan to design it and supported by Dr. Petr Smejkal, Charles University Prague, Czech (Chief Epidemioloist, Infectious Disease) working for Czech consulate/ Erbil.

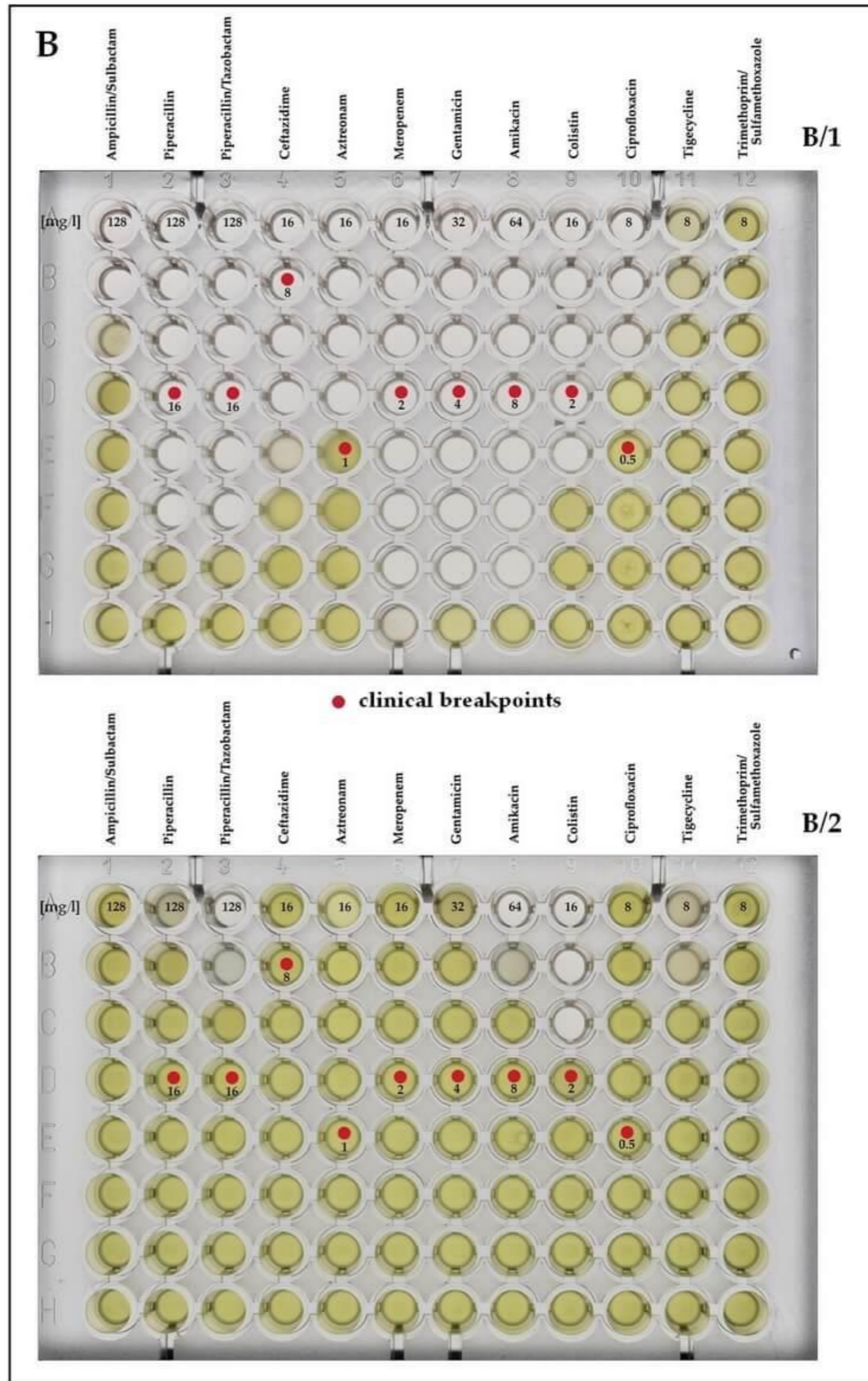
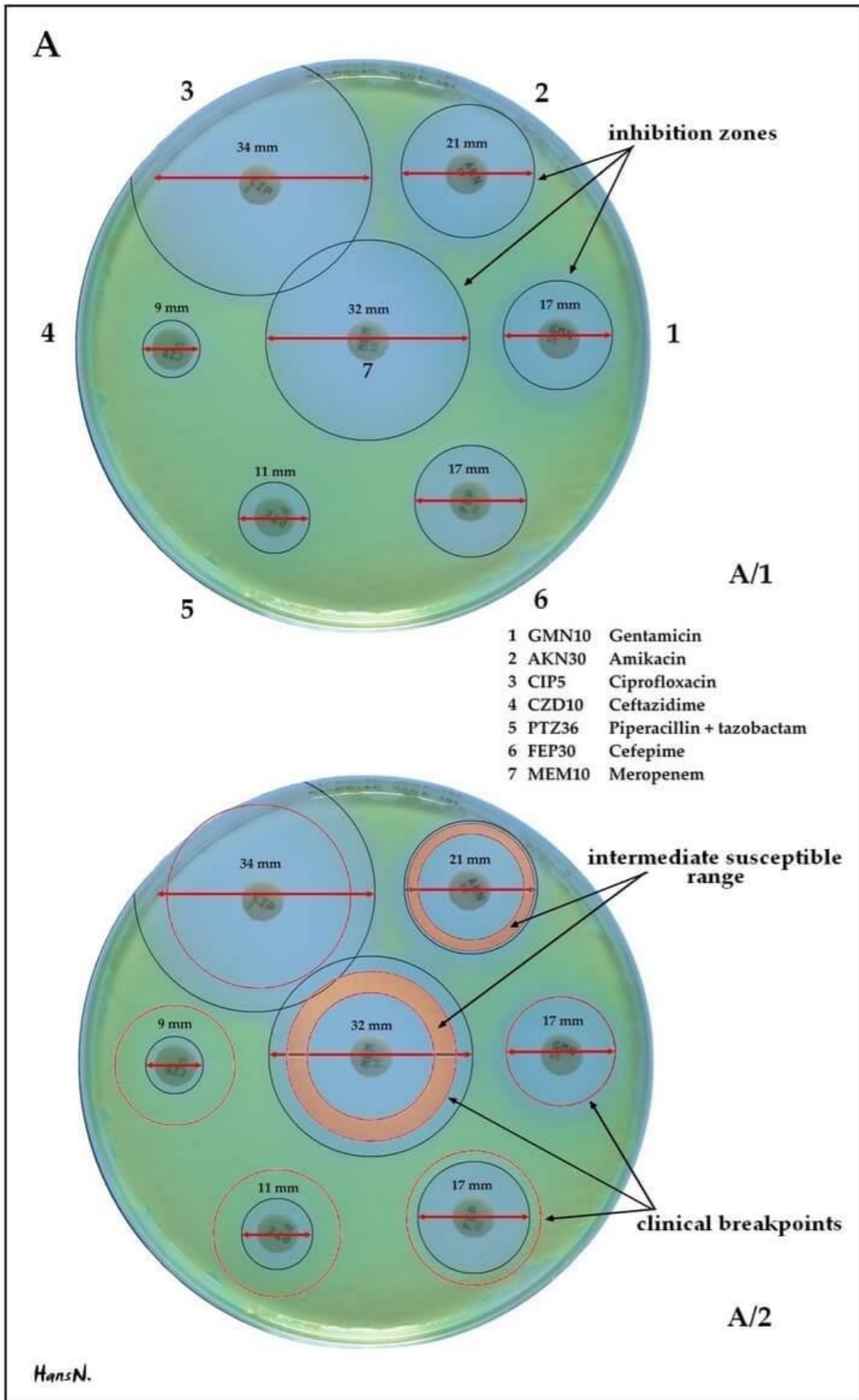




Steps to design the Antibiogram program in Erbil

Methodology

- Sample Collection
- Identification
- Antibiotic Sensitivity test: Manual or VITEK 2 Automated Systems
- Data Collection
- Data Analysis (WHONET)
- Documentation



National Antibiogram

Gram (-)	# of patients	Aminoglycosides			B-Lactams			Cephalosporins				Quinolones		Others		
		Amikacin	Gentamicin	Tobramycin	Ampicillin	Impipnem	Piperillinp Tazobactam	Cefzolin	Cefoxitin	Ceftriaxone	Ceftazidime	Ciprofloxacin	Nitrofurantion	TMP/SMX		
Echerichia coli	4	100	100	100		100	100				100	75				
Klebsiella sp	13	100	84.6	92.3	38.5	100	92.3	84.6	100	100	100	38.5	92.3	38.5		
Proteus sp	7	71.4	57.1	71.4		85.7	85.7			57.1	57.1		28.6	71.4		
Pseudomonas aeruginosa	13	100	83.3	92.3	91.7		100		81.8	100	100	30.8		69.2		
Gram (-)	# of patients	Penicillins				Cephalosporins		Quinolones		Others						
		Penicillins	Ampicillin	Oxacillin	Nafcillin	Cephalothin	Ceftriaxone	Ciprofloxacin	Moxifloxacin	Gentamacin	Linezolid	Rifampin	Tetracycline	TMP/SMX	Vancomycin	Nitrofurantion
Staph aureus (all)	8	0		0	0			0	0	87.5	100	100	100	100	100	100
Methicillin Resistant (MRSA)	8	0		0	0				0	87.5	100	100	100	100	100	100
Methicillin Susceptible (MRSA)	0															
Enterococcus sp	4	100	100					50		75			25		100	100

**Together, we can spread awareness
to stop antimicrobial resistance**



Let's unite to keep medicines working
and save lives



Thank you

Any questions or comments?