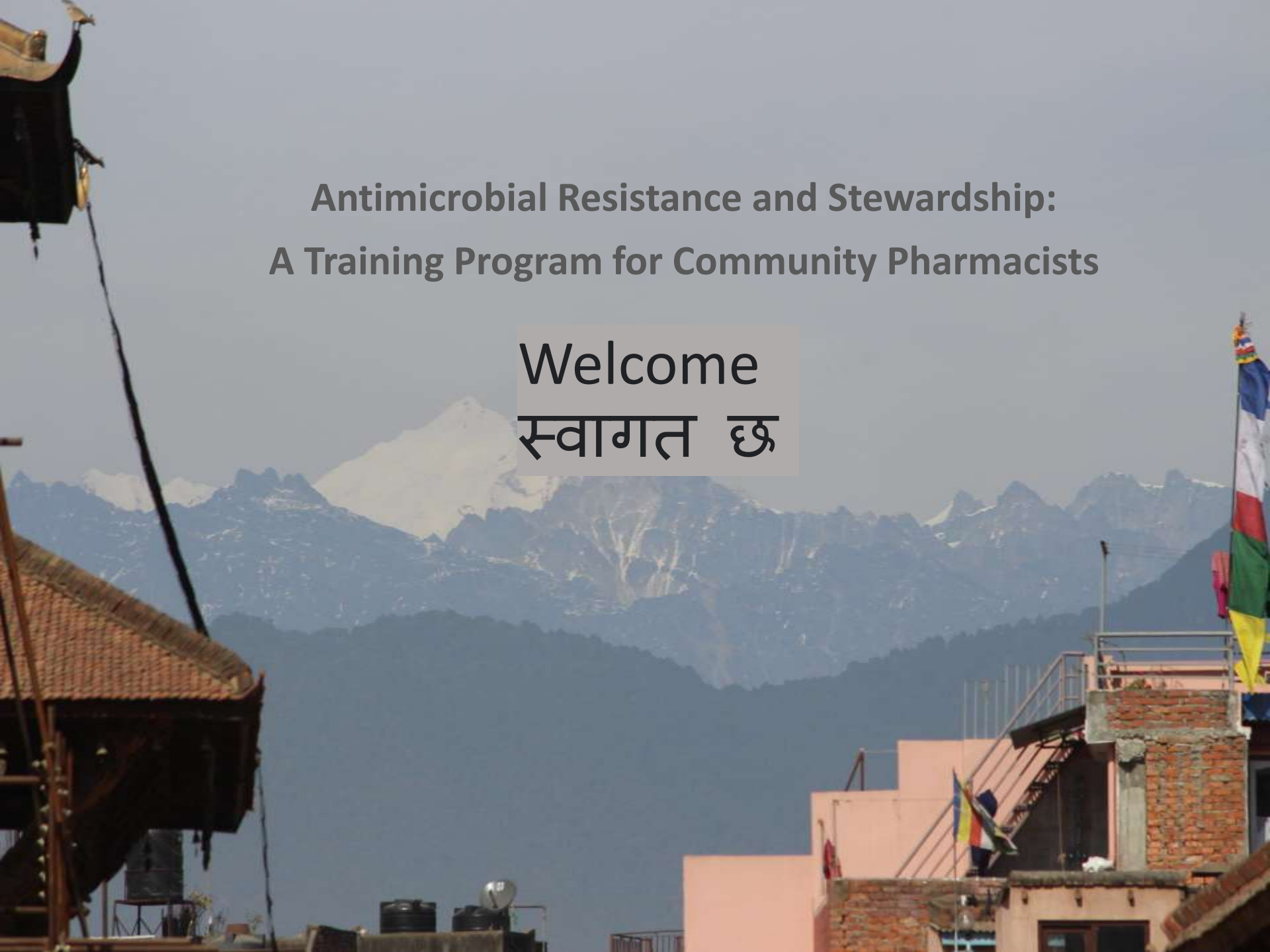


Antimicrobial Resistance and Stewardship:
A Training Program for Community Pharmacists

Welcome
स्वागत छ

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP: A TRAINING PROGRAM FOR COMMUNITY PHARMACISTS

PROGRAM OVERVIEW

PROGRAM OVERVIEW

- THE PRIMARY GOAL OF THE PROPOSED PROJECT IS THE ADAPTATION, PILOT, AND EVALUATION OF A COMMUNITY PHARMACY ANTIMICROBIAL STEWARDSHIP PROGRAM.
- THE PROGRAM IS A PART OF A LARGER INITIATIVE – STEWARDSHIP AND TRAINING IN ANTIMICROBIAL RESISTANCE (STAR). THE LARGER INITIATIVE INCLUDES TRAININGS FOR HOSPITAL HEALTH CARE PROVIDERS, COMMUNITY NURSES AND MIDWIVES, AND ASSESSMENTS OF THESE TRAINING PROGRAMS.
- THE PHARMACISTS' TRAINING PROGRAM WILL INCLUDE AN EVALUATION TO DETERMINE IF THE INFORMATION IS RELEVANT TO COMMUNITY PHARMACISTS' PRACTICES AND IF KNOWLEDGE GAINED HAS SUPPORTED ENGAGEMENT IN AMR STEWARDSHIP.

TRAINING OBJECTIVES

- TO INCREASE KNOWLEDGE AND UNDERSTANDING AMONG COMMUNITY PHARMACISTS ABOUT ANTIMICROBIAL RESISTANCE (AMR) AND ASSOCIATED HEALTH RISKS;
- TO INCREASE KNOWLEDGE OF PHARMACY-BASED STEWARDSHIP TO HELP DECREASE AMR IN NEPAL;
- TO INCREASE KNOWLEDGE OF INFECTION PREVENTION AND CONTROL (IPC) FOR PHARMACY SETTINGS;
- TO SUPPORT PHARMACISTS TO COMMUNICATE WITH THEIR CLIENTS AND COMMUNITIES ABOUT ANTIBIOTICS AND INFECTION PREVENTION AND CONTROL TO CREATE A HEALTHIER ENVIRONMENT

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

MODULE 1: COMMUNITY PHARMACISTS: ROLES AND RESPONSIBILITIES

MODULE 1 OBJECTIVES

- TO DESCRIBE THE ROLES AND RESPONSIBILITIES OF COMMUNITY PHARMACISTS WITHIN THE HEALTH SYSTEM
- TO DESCRIBE THE LEGAL AND REGULATORY POLICIES IN RELATION TO PHARMACISTS' ROLE IN DISPENSING MEDICATIONS

COMMUNITY PHARMACIES

PHARMACIES PROVIDE MUCH NEEDED SERVICES TO IMPROVE THE HEALTH OF COMMUNITIES THROUGHOUT NEPAL.

COMMUNITY PHARMACIES

- PHARMACIES MEET MANY COMMUNITY NEEDS THROUGHOUT NEPAL
  - PROVIDE OVER-THE-COUNTER MEDICATIONS AND ADVICE ON TYPES OF MEDICATIONS FOR VARIOUS SYMPTOMS
  - FILL PRESCRIPTIONS
  - AND IN SOME INSTANCES SELL TRADITIONAL MEDICINES AND VARIOUS NON-PHARMACEUTICAL PRODUCTS THAT CONTRIBUTE TO HEALTH & WELL-BEING (E.G., TOOTHPASTE, SOAPS, BABY FORMULA)

http://www.nhssp.org.np/NHSSP_Archives/human_resources/HRH_Nepal_profile_august2013.pdf

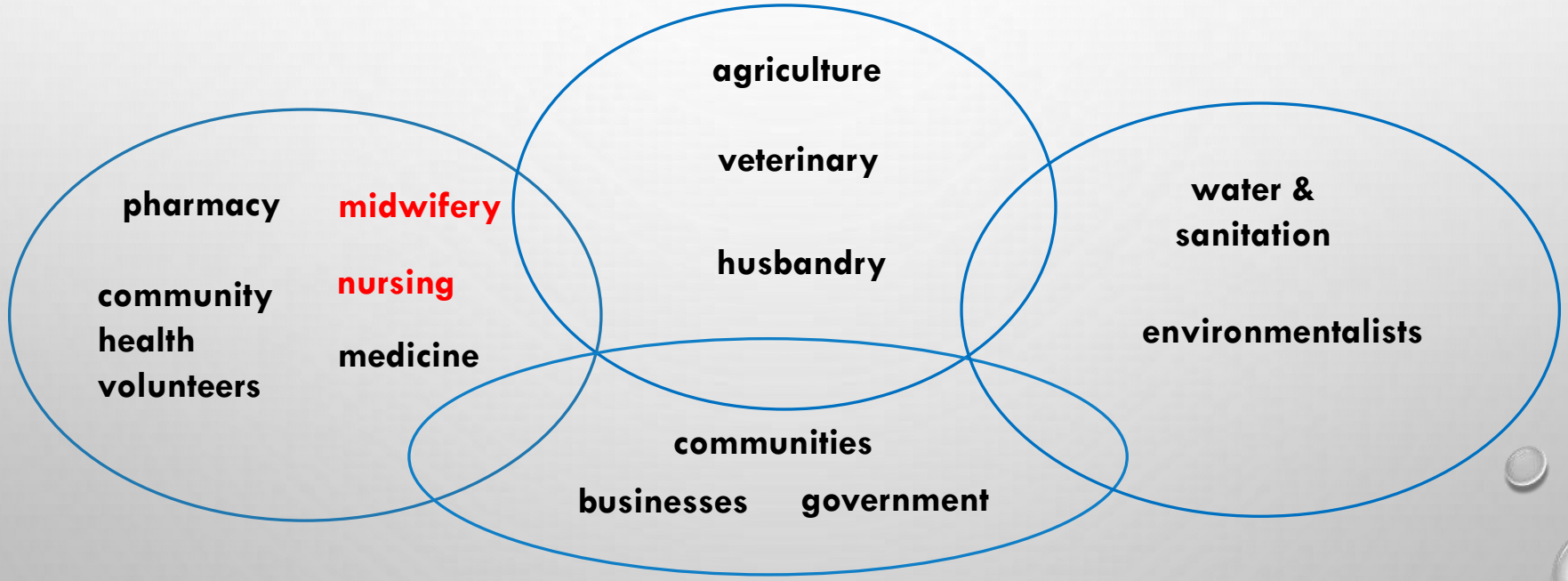
COMMUNITY PHARMACIES

- MANY COMMUNITIES HAVE LITTLE OR NO ACCESS TO PHYSICIANS AND/OR HOSPITALS AND THEREFORE COMMUNITY HEALTH FACILITIES INCLUDING PHARMACIES PROVIDE ESSENTIAL HEALTH CARE.
  - NEPAL WAS FOUND TO HAVE **0.17 DOCTORS PER 1,000/POPULATION AND 0.50 NURSES PER 1,000/POPULATION.** THIS REPRESENTS 0.67 DOCTORS AND NURSES PER 1,000/POPULATION, WHICH IS SIGNIFICANTLY LESS THAN THE **WHO RECOMMENDATION OF 2.3 DOCTORS, NURSES AND MIDWIVES PER 1,000/POPULATION**.
  - **THESE PROPORTIONS VARY ACROSS AREAS OF NEPAL,** E.G., THE TERAI ZONE HAD ONLY 36% OF HEALTH WORKERS WHEN IT ACCOUNTED FOR 50% OF THE COUNTRY'S POPULATION IN 2011. SIXTY-SIX PERCENT OF ALL DOCTORS AND 58% OF ALL NURSES WERE LOCATED IN THE HILLS INCLUDING KATHMANDU VALLEY.

http://www.nhssp.org.np/NHSSP_Archives/human_resources/HRH_Nepal_profile_august2013.pdf

COMMUNITY PHARMACIES

ANTIMICROBIAL STEWARDSHIP IS A RESPONSIBILITY ACROSS SECTORS AND COMMUNITIES



LEGAL PROVISIONS ON ANTIMICROBIAL HANDLING IN NEPAL

MR. NARAYAN DHAKAL

ANTIMICROBIAL REGULATORY FRAMEWORK

- DEPARTMENT OF DRUG ADMINISTRATION AS PER SECTION (5) OF THE DRUG ACT AS **PRINCIPLE AGENCY TO REGULATE MEDICINES INCLUDING ANTIMICROBIALS** IN NEPAL
- **REQUIREMENTS OF REGISTRATION OF MANUFACTURE, SALES AND DISTRIBUTION, CH4 AND SECTION (7)..(10)**
  - MANUFACTURING COMPANY RECOMMENDATION, PRODUCT LICENSES, MARKETING AUTHORISATION, IMPORT RECOMMENDATION, AND SALES AND DISTRIBUTION FIRM REGISTRATION
- **SALE AND DISTRIBUTION OF REGISTERED DRUGS ONLY SECTION (10A)**
  - ONLY REGISTERED FIRM AND PERSON CAN SALE AND DISTRIBUTE REGISTERED PRODUCTS IN THE COUNTRY

ANTIMICROBIAL REGULATORY FRAMEWORK

- **REQUIREMENT- OF RENEWAL OF THE LICENSES SECTION (11)**
  - TWO YEARS AFTER FIRST DATE OF REGISTRATION AND EVERY YEAR
- **PROVISIONS ON CLASSIFICATION OF DRUGS, SECTION (17) SUN SECTION (1)….(4):**
  - THE DRUGS MAY BE CLASSIFIED INTO CATEGORIES “A” “B” AND “C” OR SUB-CATEGORIES, AS PRESCRIBED.
  - NO PERSON SHALL SELL OR DISTRIBUTE SUCH DRUGS WITHOUT PRESCRIPTION OF A DOCTOR AS CATEGORIZED NOT TO BE SOLD OR DISTRIBUTED WITHOUT SUCH PRESCRIPTION PURSUANT TO SUB-SECTION (1)

ANTIMICROBIAL REGULATORY FRAMEWORK

- **PROHIBITION ON MISUSE AND ABUSE OF DRUG(..ANTIMICROBIALS), SECTION (18), SUBSECTION(1) AND (2)**
  - SHOULD ABIDE-BY THE PROVISIONS OF SECTION 17 (SUBSECTION (2) AND (3))

- **PROHIBITION ON MANUFACTURE, SALE, DISTRIBUTION, DISPENSING OR STORAGE WITHOUT MAKING <u>ARRANGEMENT OF REQUIRED HUMAN RESOURCE OR RESOURCES</u>**
  - ARRANGEMENT TO STORAGE, SALES AND DISTRIBUTION BY QUALIFIED PERSON ARE MAIN

- **PROVISIONS RELATED TO PRESCRIPTION, SECTION (17)**
  - PRESCRIPTION CAN BE GIVEN BY REGISTERED PHYSICIAN, INTEGRATED DOCTOR AN HEALTH WORKER AS PRESCRIBED
- **PENALTY FOR VIOLATION OF LEGAL PROVISIONS, SECTION (34), SUBSECTION (1), (2) AND (3)**

ANTIMICROBIAL REGULATORY FRAMEWORK

DRUG STANDARD RULE 2043, **RULE (10), SCHEDULE (4) PRESCRIBE CLASSIFICATION OF DRUG :**

- FOR THE PURPOSE OF CATEGORIZATION OF DRUGS PURSUANT TO SECTION 17 OF THE ACT, DRUGS ARE CLASSIFIED IN **CATEGORIES "A", "B" AND "C"** AND EVERY CATEGORIES MAY HAVE SUB CATEGORIES. THE DRUGS CLASSIFIED IN CATEGORIES "A", "B" AND "C"
- CATEGORY "A" CONSISTS OF NARCOTIC AND POISONOUS DRUGS AND **CATEGORY "B" CONSISTS ANTIBIOTICS,** HORMONES, ETC
- DRUGS UNDER THESE CATEGORIES SHALL BE SOLD ONLY ON THE PRESCRIPTION OF A DOCTOR AND THESE DRUGS SHALL BE SOLD BY A PHARMACIST OR BY A PROFESSIONAL HIMSELF OR ONLY IN THE PRESENCE OF ANY ONE
- THE DRUGS UNDER CATEGORY "C" MAY BE SOLD BY ANY SELLER ON THE BASIS OF EXPERIENCE AND EVEN WITHOUT THE PRESCRIPTION OF DOCTOR

DISCUSSION QUESTIONS

- WHO IS LEGALLY ALLOWED TO PRESCRIBED NON-OTC PHARMACEUTICAL DRUGS?
- WHAT CATEGORY OF DRUGS ARE ANTIBIOTICS?

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

MODULE 2: INTRODUCTION TO AMR AND STEWARDSHIP

Dr. Sameer Mani Dixit
Director of Research, CMDN

MODULE 2 OBJECTIVES

- TO UNDERSTAND THE FACTORS WHICH CONTRIBUTE TO ANTIMICROBIAL RESISTANCE
- TO UNDERSTAND THE 'ONE HEALTH APPROACH'
- TO UNDERSTAND HOW BACTERIA BECOMES RESISTANT
- TO INCREASE KNOWLEDGE ABOUT THE RISKS ASSOCIATED WITH AMR
- TO INCREASE KNOWLEDGE OF WHAT PATHOGENS PRESENT THE GREATEST RISK
- TO UNDERSTAND WAYS TO ADDRESS AMR

WHAT IS ANTIMICROBIAL RESISTANCE?

- "A POST-ANTIBIOTIC ERA MEANS … AN END TO MODERN MEDICINE AS WE KNOW IT. THINGS AS COMMON AS STREP THROAT OR A CHILD'S SCRATCHED KNEE COULD ONCE AGAIN KILL."

MARGARET CHAN, WORLD HEALTH ORGANIZATION DIRECTOR-GENERAL

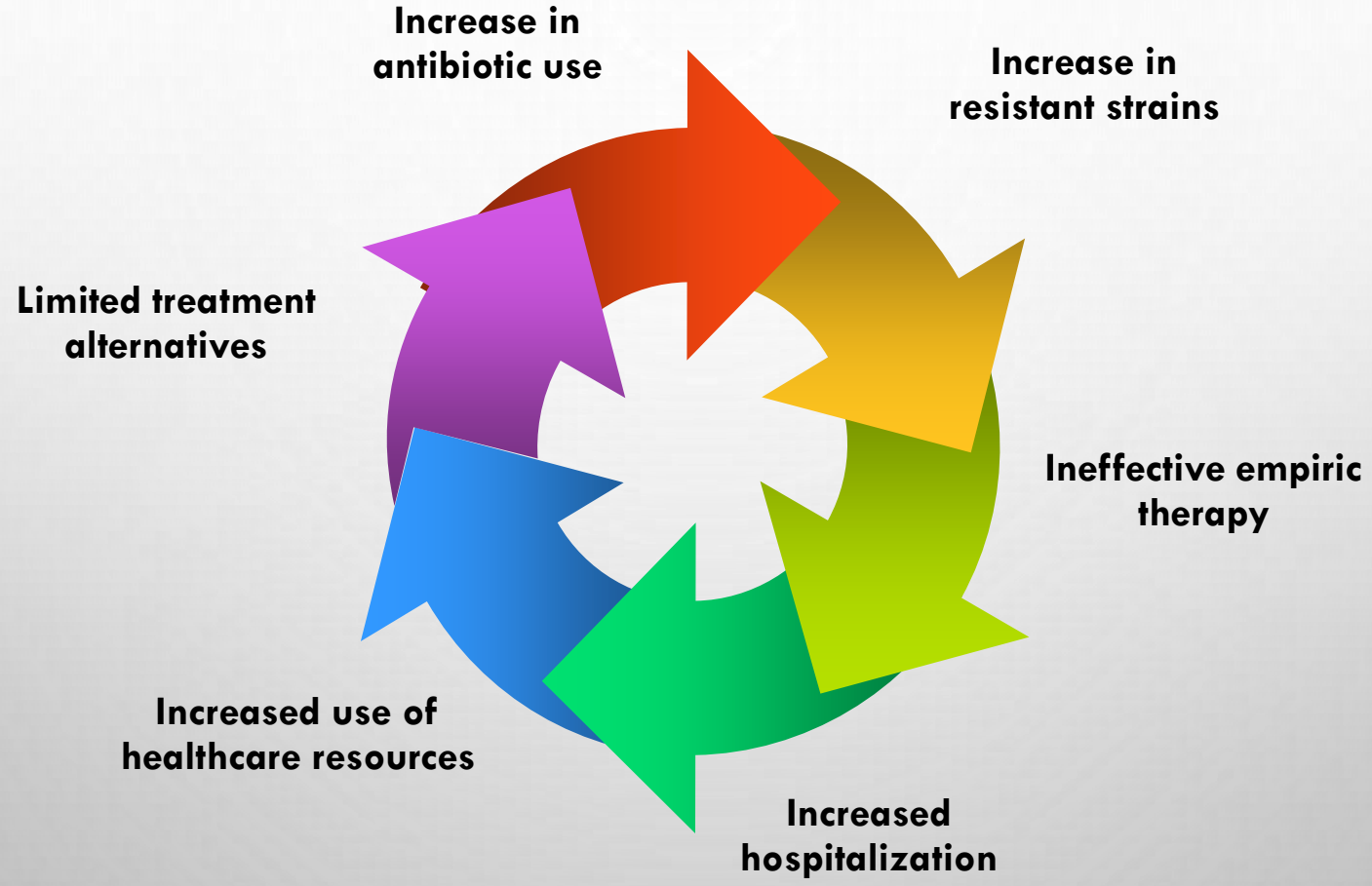
WHAT IS AMR

Antimicrobial resistance (AMR) is the ability of a microorganism (**bacteria**, viruses, and some parasites) to stop an antimicrobial (**antibiotics**, antivirals and antimalarials) from working against it. As a result, standard treatments become ineffective, infections persist and may spread to others.[1]

Today, an estimated 700,000 deaths attributable to AMR every year. In 30 years, this number could reach 10,000,000 deaths.[2]

[1,2] https://www.who.int

ANTIBIOTIC CYCLE OF RESISTANCE



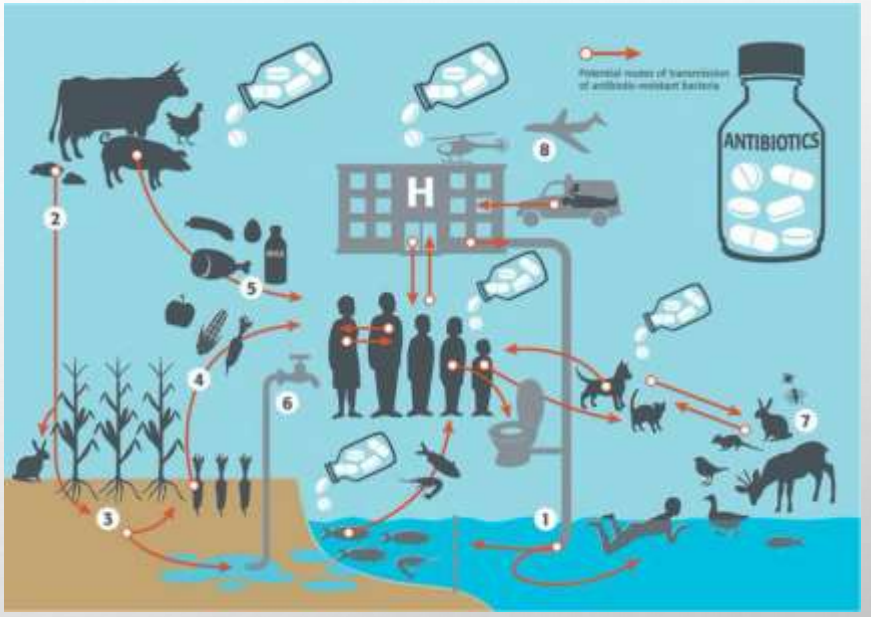
HOW DO BACTERIA BECOME RESISTANT?

- ANTIBIOTIC RESISTANCE OCCURS NATURALLY OVER TIME, USUALLY THROUGH GENETIC CHANGES. HOWEVER, THE MISUSE AND OVERUSE OF ANTIBIOTICS IS ACCELERATING THIS PROCESS.
- ANTIBIOTICS ARE MISUSED IN PEOPLE AND ANIMALS.
  - ANTIBIOTICS USED TO TREAT VIRAL INFECTIONS LIKE COLDS AND FLU
  - ANTIBIOTICS GIVEN AS GROWTH PROMOTERS IN ANIMALS.
- ANTIBIOTIC RESISTANT-MICROBES ARE FOUND IN PEOPLE, ANIMALS, FOOD, AND THE ENVIRONMENT (IN WATER, SOIL AND AIR). THEY CAN SPREAD BETWEEN PEOPLE AND ANIMALS, INCLUDING FROM FOOD OF ANIMAL ORIGIN, AND FROM PERSON TO PERSON. POOR INFECTION CONTROL, INADEQUATE SANITARY CONDITIONS AND INAPPROPRIATE FOOD-HANDLING ENCOURAGE THE SPREAD OF ANTIMICROBIAL RESISTANCE.

[1] HTTPS://WWW.WHO.INT/ANTIMICROBIAL-RESISTANCE/EN/

TRANSMISSION OF AMR BACTERIA

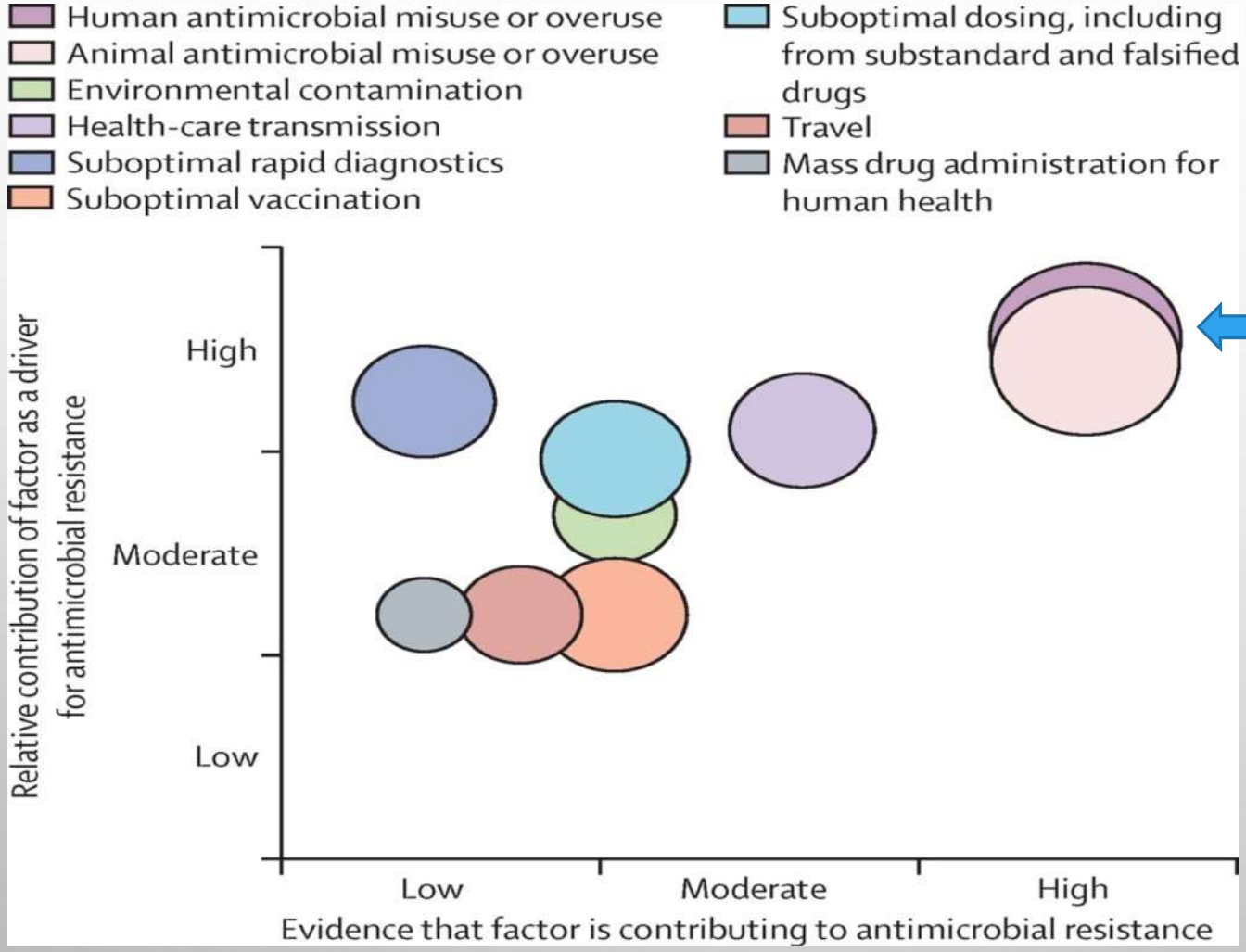
- 1. POLLUTION FROM PHARMACEUTICAL PRODUCTION. HOSPITALS AND OTHER HEALTH FACILITIES;
- 2/3. USE OF ORGANIC ANIMAL WASTE/MANURES IN AGRICULTURE;
- 4/5. CONSUMPTION OF FOODS EXPOSED TO WASTE/ANIMAL MANURE;
- 6. PROXIMITY OF WATER SUPPLIES TO SEPTIC/SANITATION SYSTEMS;
- 7. MISUSE OF ANTIBIOTICS IN VETERINARY MEDICINE. HUMAN CONSUMPTION OF ANTIBIOTICS
- 8. TRAVEL BETWEEN COUNTRIES/REGIONS.



WHAT IS A ONE HEALTH APPROACH?

- 'ONE HEALTH' IS AN APPROACH TO DESIGNING AND IMPLEMENTING PROGRAMS, POLICIES, LEGISLATION AND RESEARCH IN WHICH MULTIPLE SECTORS COMMUNICATE AND WORK TOGETHER TO ACHIEVE BETTER PUBLIC HEALTH OUTCOMES.
- A ONE HEALTH APPROACH IS PARTICULARLY RELEVANT FOR COMBATTING ANTIBIOTIC RESISTANCE AND SUPPORTING STEWARDSHIP.

HTTPS://WWW.WHO.INT/FEATURES/QA/ONE-HEALTH/EN/



The greatest contributions to AMR are misuse and overuse of antimicrobials in humans and animals

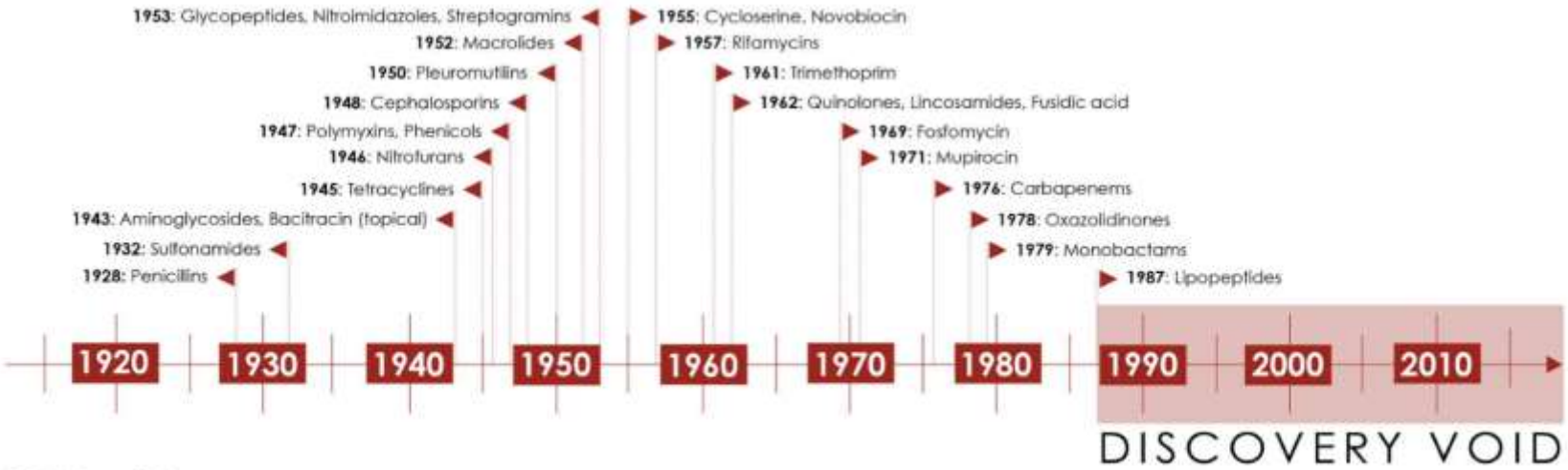
WHY IS AMR A RISK?

- **ORGANISMS WHICH PRESENT THE GREATEST THREAT (WORLD HEALTH ORGANIZATION)**
  - MULTIDRUG-RESISTANT *ACINETOBACTER*
  - EXTENDED SPECTRUM B-LACTAMASE PRODUCING ENTEROBACTERIACEAE (ESBLS)
  - DRUG-RESISTANT *SALMONELLA* TYPHI
  - METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA)
  - DRUG-RESISTANT *STREPTOCOCCUS PNEUMONIAE*
  - VANCOMYCIN-RESISTANT *STAPHYLOCOCCUS AUREUS* (VRSA)
  - CARBAPENEM-RESISTANT ENTEROBACTERIACEAE (CRE)
  - VANCOMYCIN-RESISTANT *ENTEROCOCCUS* (VRE)

WHY IS AMR A RISK?

Antibiotic Pipeline Dry

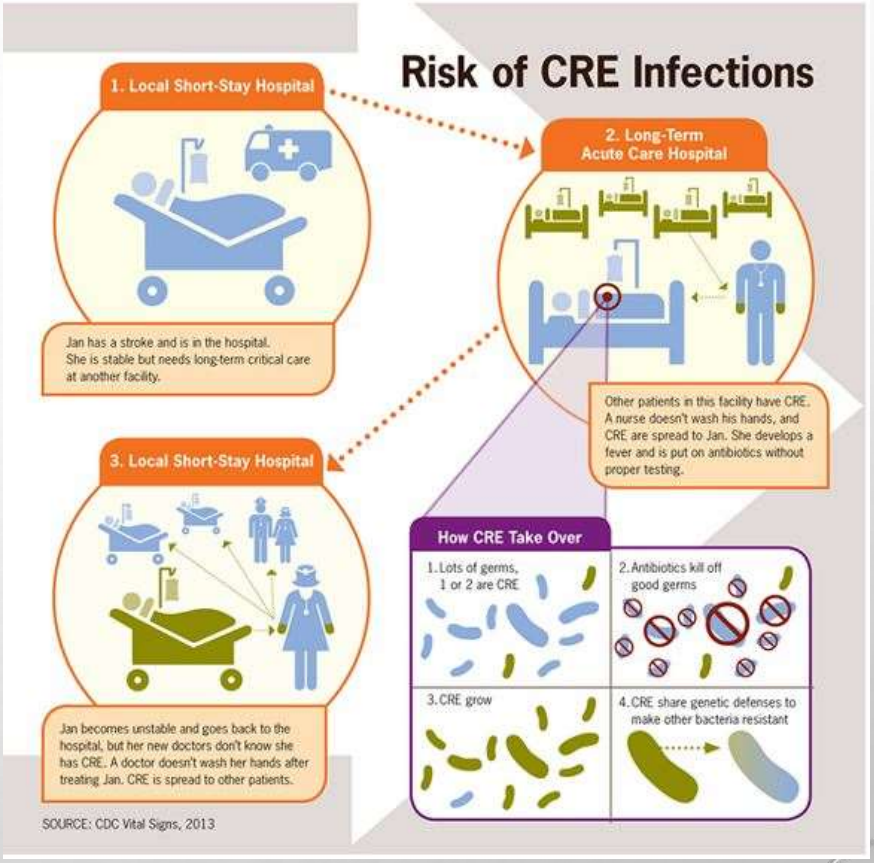
Decrease in number of new antibiotics



CASE STUDY: CRE INFECTIONS

Carbapenem-resistant Enterobacteriaceae (CRE) are strains of bacteria that are resistant to an antibiotic class (carbapenem) used to treat severe infections. CRE are also resistant to most other commonly used antibiotics and in some cases to all available antibiotics. CRE pathogens can spread and share their antibiotic-resistant qualities with healthy bacteria in your body.

https://www.mayoclinic.org/diseases-conditions/infectious-diseases/in-depth/cre-bacteria/art-20166387#:~:text=Carbapenem%2Dresistant%20Enterobacteriaceae%20(CRE),cases%20to%20all%20available%20antibiotics.



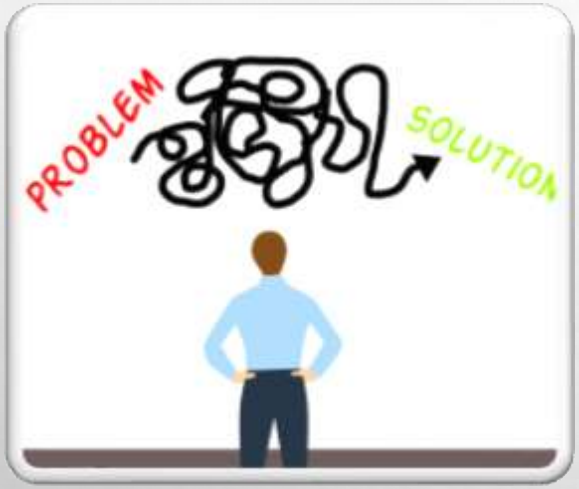
CASE STUDY: TYPHOID FEVER (*S. TYPHI*)

Coalition Against Typhoid Available at: https://www.coalitionagainsttyphoid.org/wp-content/uploads/2019/06/epal_InfograNphic_English.pdf

https://aac.asm.org/content/64/5/e02581-19

- 12 TO 21 MILLION CASES OF TYPHOID FEVER ANNUALLY. 75% IN SOUTH ASIA. NEPAL HAS ONE OF THE HIGHEST LEVELS OF BURDEN FOR TYPHOID FEVER.
  - **IN NEPAL, AN ESTIMATED 351/100,000 PEOPLE CONTRACTED TYPHOID FEVER IN 2017**
- FIRST LINE TREATMENT INCLUDED AMPICILLIN, TRIMETHOPRIM-SULFAMETHOXAZOLE, CHLORAMPHENICOL. RESISTANCE TO THESE FIRST LINE ANTIBIOTICS WERE OBSERVED IN THE 1980'S.
- FLUOROQUINOLONES BECAME A PRIMARY SOURCE OF TREATMENT UNTIL 2014 DATA INDICATED HIGH RATES OF TREATMENT FAILURE OCCURRING DUE TO RESISTANCE TO FLUOROQUINOLONES.
- INCREASED RESISTANCE TO FLUOROQUINOLONES LED TO USE OF 3RD GENERATION CEPHALOSPORINS
- 2016 IDENTIFICATION OF XDR (EXTENSIVELY DRUG RESISTANT) *S.* TYPHI IN PAKISTAN
  - TREATMENT RESTRICTED TO AZITHROMYCIN AND CARBAPENEMS

HOW CAN AMR BE ADDRESSED?



- 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 PREVENTION & CONTROL**
- **IMPROVE PREVENTION STRATEGIES; E.G., IMMUNIZATION**
- INNOVATION: ALTERNATIVES TO ANTIBIOTICS

HOW CAN AMR BE ADDRESSED?

Antimicrobial stewardship programs optimize the use of antimicrobials, improve patient outcomes, reduce AMR and health-care-associated infections, and save health-care costs.

Optimizing antibiotic use includes:

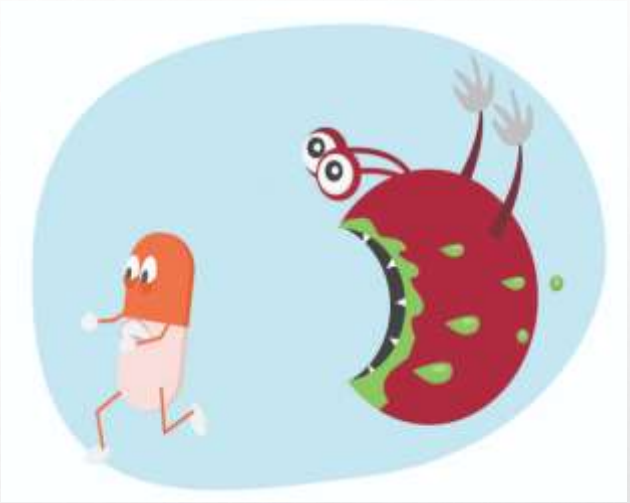
- only **use when needed**
- use the **right agent** (antibiotic)
- at the **right dose**
- for the **right duration**

DISCUSSION QUESTIONS

- WHAT ARE THE PRIMARY CAUSES OF ANTIMICROBIAL RESISTANCE?
- HOW DOES ANTIMICROBIAL RESISTANCE AFFECT THE COMMUNITIES WHERE YOU LIVE AND WORK?
- WHAT IS THE ROLE OF STEWARDSHIP IN ADDRESSING ANTIMICROBIAL RESISTANCE?

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

MODULE 3: AMR IN NEPAL



ANTIMICROBIAL RESISTANCE IN NEPAL

DR. BASUDHA SHRESTHA

SENIOR CONSULTANT MICROBIOLOGIST

PHECT-NEPAL/KATHMANDU MODEL HOSPITAL

ANTIMICROBIAL RESISTANCE & STEWARDSHIP: AMR IN NEPAL

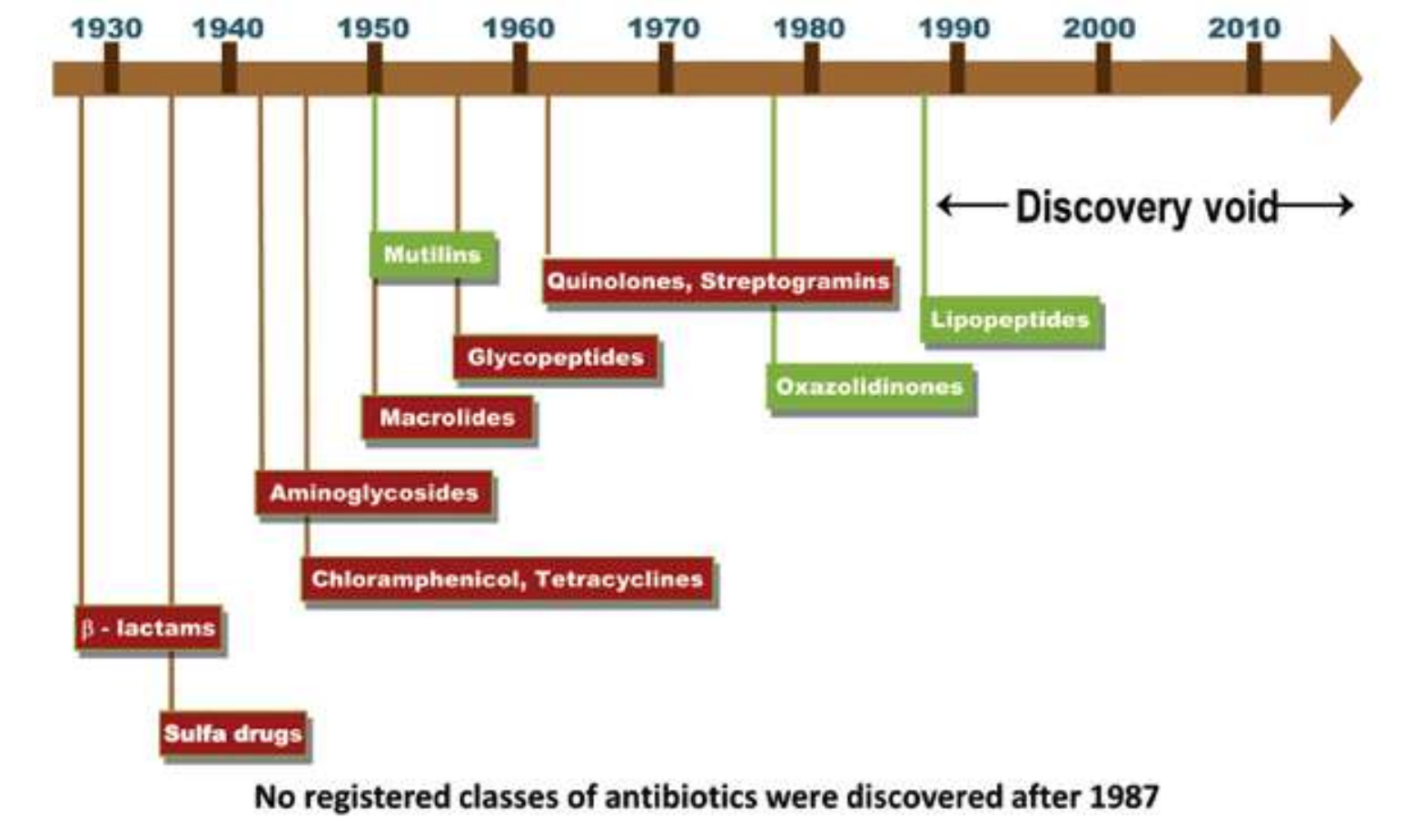
ANTIMICROBIAL RESISTANCE PATTERNS VARY ACROSS COUNTRIES AND ACROSS REGIONS WITHIN COUNTRIES. NATIONAL AND LOCAL DATA ARE IMPORTANT TO UNDERSTANDING AMR AND WHICH ANTIBIOTICS ARE LIKELY TO BE MORE OR LESS EFFECTIVE.

LOCAL COMMUNITIES OFTEN DO NOT HAVE THE INFRASTRUCTURE FOR SURVEILLANCE. HOWEVER, WE WILL PRESENT SOME NATIONAL DATA FROM NEPAL.

MODULE 3 OBJECTIVES

- TO UNDERSTAND THE MECHANISM OF ACTION OF ANTIBIOTICS
- TO UNDERSTAND PRESSURE AND RESISTANCE
- TO UNDERSTAND WHAT MULTIDRUG RESISTANCE IS AND ASSOCIATED RISKS
- TO INCREASE KNOWLEDGE ABOUT THE AMR SURVEILLANCE STRATEGY IN NEPAL
- TO INCREASE KNOWLEDGE ABOUT AMR PATTERNS IN NEPAL

BRIEF HISTORY OF ANTIBIOTICS



MECHANISM OF ACTION OF ANTIBIOTICS

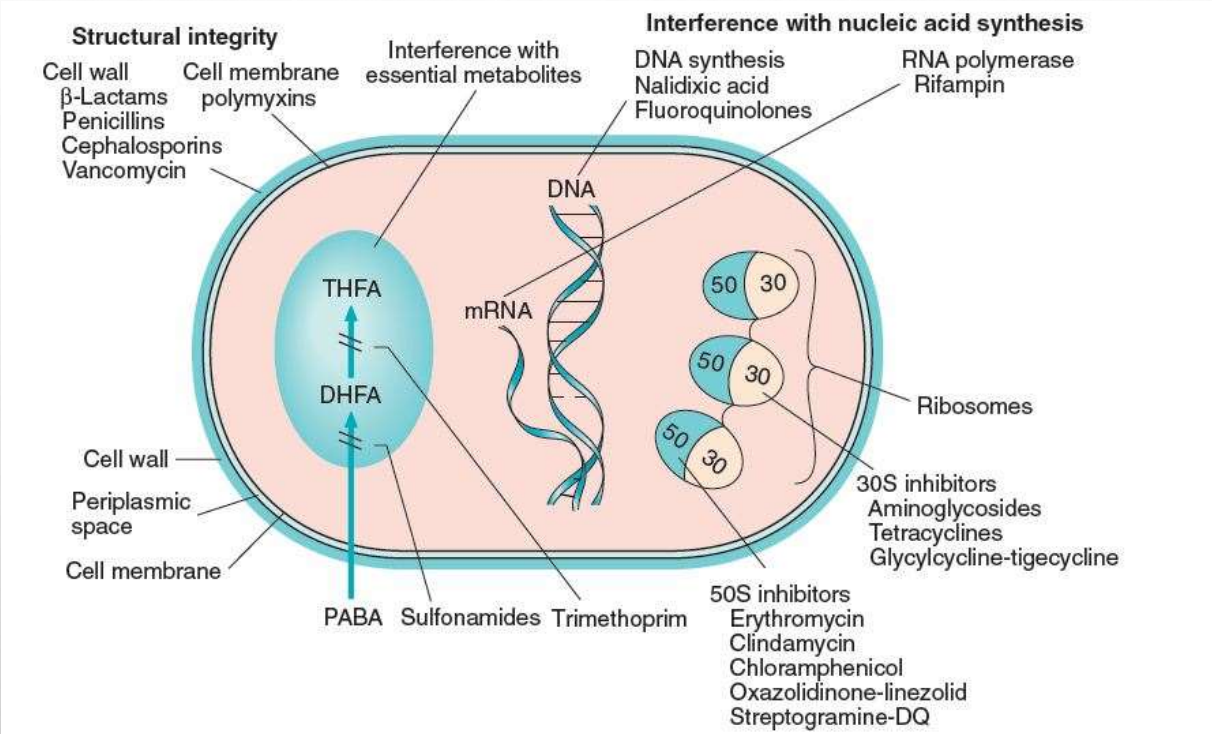


FIGURE 12-1 Primary sites of antibacterial action for major classes of antimicrobial agents. *DHFA,* dihydrofolic acid; P*ABA, para*-aminobenzoic acid; *THFA,* tetrahydrofolic acid.

MAHON CR, LEHMAN DC, MANUSELIS G. A TEXTBOOK OF DIAGNOSTIC MICROBIOLOGY 5TH ED

DEVELOPMENT OF RESISTANCE TO NEWLY INTRODUCED ANTIMICROBIALS

Agent	Year of FDA approval	First reported resistance
Penicillin	1943	1940
Streptomycin	1947	1947
Tetracycline	1952	1956
Methicillin	1960	1961
Nalidixic acid	1964	1966
Gentamycin	1967	1969
Vancomycin	1972	1987
Cefotaxime	1981	1981(AmpC) 1983(ESBL)
Linezolid	2000	1999

Bush K. ASM news.. 2004;70:282-287


What Causes Antibiotic Resistance?

MORE FREQUENT IN DEVELOPING COUNTRIES LIKE NEPAL

ANTIBIOTIC PRESSURE AND RESISTANCE IN BACTERIA

- ANTIBIOTICS ALSO KILL NON-PATHOGENIC MICROBES
- THIS REDUCES THE COMPETITION FOR THE RESISTANT PATHOGENS
- THE USE OF ANTIBIOTICS ALSO PROMOTES ANTIBIOTIC RESISTANCE IN NON- PATHOGENS
- THESE NON-PATHOGENS MAY LATER PASS THEIR **RESISTANT GENES** ON TO OTHER PATHOGENS

MULTIDRUG-RESISTANCE (MDR)

MULTIDRUG RESISTANCE IS A CONDITION ENABLING A DISEASE CAUSING ORGANISM TO RESIST DISTINCT DRUG AND CHEMICALS OF A WIDE VARIETY OF STRUCTURE AND FUNCTION TARGETED TO ERADICATE THE ORGANISM

MULTIDRUG-RESISTANCE ORGANISMS (MDROS)

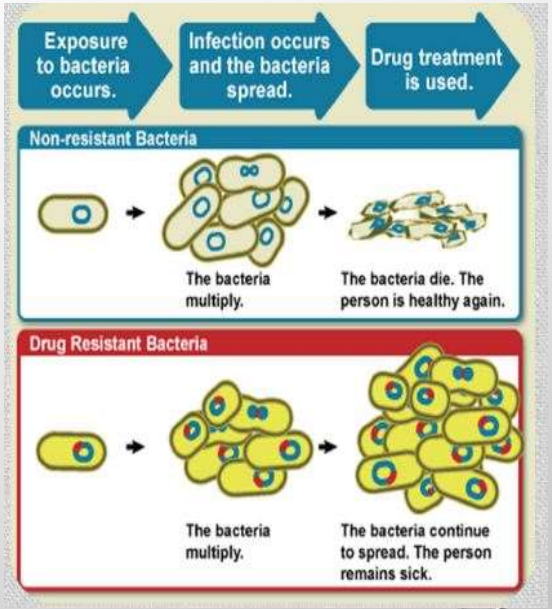
MULTIDRUG-RESISTANT ORGANISMS ARE BACTERIA THAT HAVE BECOME RESISTANT TO CERTAIN ANTIBIOTICS, AND THESE ANTIBIOTICS CAN NO LONGER BE USED TO CONTROL OR KILL THE BACTERIA


ANTIBIOTIC RESISTANCE
POSES A BIG THREAT TO
GLOBAL HEALTH
HANDLE
ANTIBIOTICS
WITH CARE
World Health
Organization

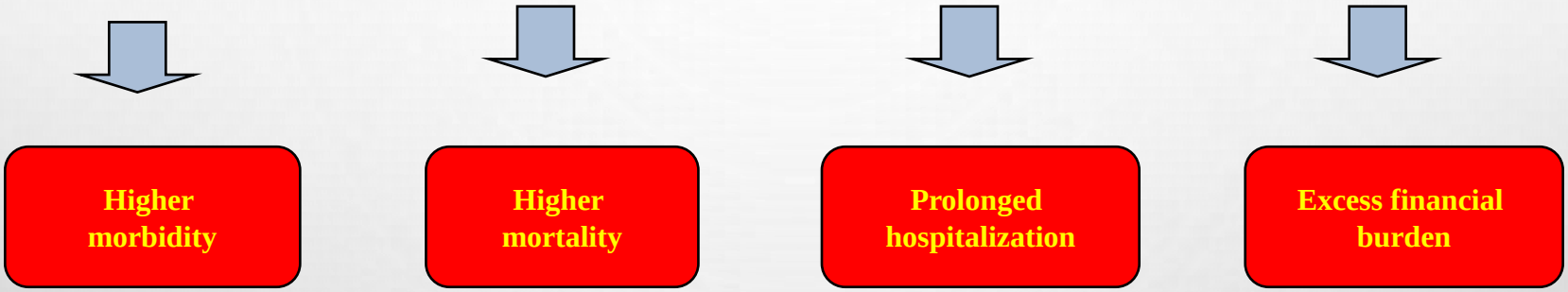

The crisis is mostly invisible
Usually we still do have at least one antibiotic active for each patient
But no new antibiotics + resistance is on the rise
Pascal
Experts say we can fall anytime !

CONSEQUENCES OF ANTIMICROBIAL RESISTANCE

- COMPROMISED THERAPY OF HUMAN INFECTIONS
- SERIOUS COMPLICATIONS FOR ELDERLY AND CHILDREN
- INCREASED LENGTH OF THERAPY AND MORE DOCTOR VISITS
- PROLONGED HOSPITAL STAY AND SIGNIFICANT INCREASE OF TREATMENT COST
- "BACTERIAL RESISTANCE IS A MAJOR THREAT TO PUBLIC HEALTH"



INFECTIONS WITH RESISTANT ORGANISMS RESULT IN



INCREASING RESISTANCE: A SERIOUS & GLOBAL PROBLEM

Masterton RG. Int J Antimicrob Agents. 2009 Feb;33(2):105-10

AMR SURVEILLANCE IN NEPAL

OBJECTIVES OF AMR SURVEILLANCE

- Recognize the problem of AMR
- Detect emergence of AMR and monitor resistance patterns
- Trace source and spread of drug resistance
- Provide susceptibility data to physicians for directing therapy
- Formulate appropriate antibiotic policy guidelines
- Implement measures for prevention of AMR
- To interpret and integrate the resistance data to everyday practice of medicine
- To develop awareness among public and physicians regarding AMR and rational drug use

LAB-BASED AMR SURVEILLANCE: HOW DOES IT WORK?

Surveillance in Nepal started in 1999 with 9 laboratories monitoring six pathogens of interest

Enteric fever and food poisoning: *Salmonella* spp
Diarrheal illness: *Shigella* spp, *V.cholerae*
Blood stream and respiratory infections: *S.pneumoniae*, *H. influenzae*,
STD: *N.gonorrhoea*,
Complicated UTI: ESBL *E.coli*
Nosocomial pathogens: MRSA, MDR *Klebsiella* and *Acinetobacter* spp

Currently, 27 hospitals/laboratories are included in AMR surveillance of 10 organisms of interest

GENERAL OVERVIEW

1999
- *Shigella* spp
- *Vibrio cholerae*
- *Streptococcu spneumoniae*
- *H. influenzae*
- *Neisseria gonorrhoeae*

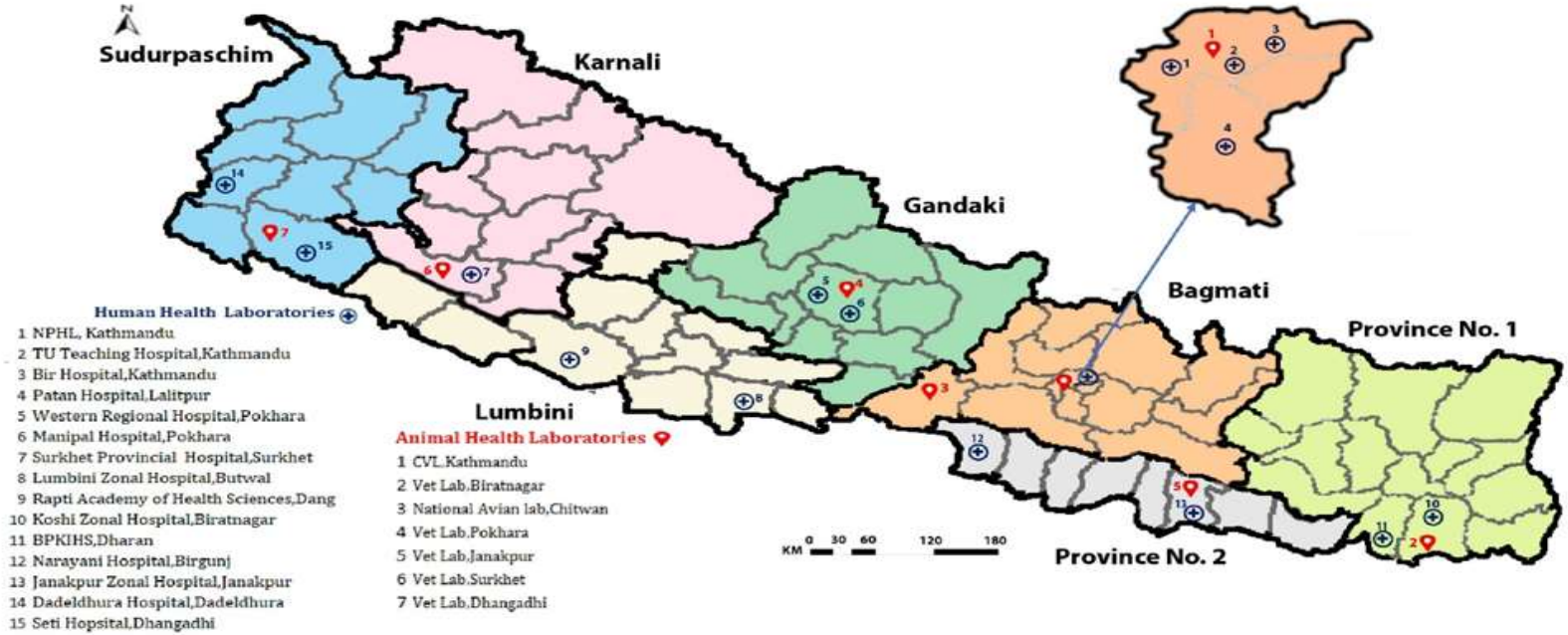
2002
- *Salmonella* Typhi and Paratyphi

2009
- ESBL producing *E. coli*

2013
- Methicillin resistant Staph. aureus (MRSA)

2016
- MDR Acinetobacter
- MDR Klebsiella

NEPAL SENTINEL SITES OF AMR SURVEILLANCE



SURVEILLANCE METHODS

At Sites

- Sample received and processed following standard microbiological techniques
- Organism of interest are isolated, identified and reported along with the AST pattern

Interlink

- Monthly Data on AST along with 10% isolates are sent to NPHL
- NPHL verifies the isolates and send feedback

NPHL

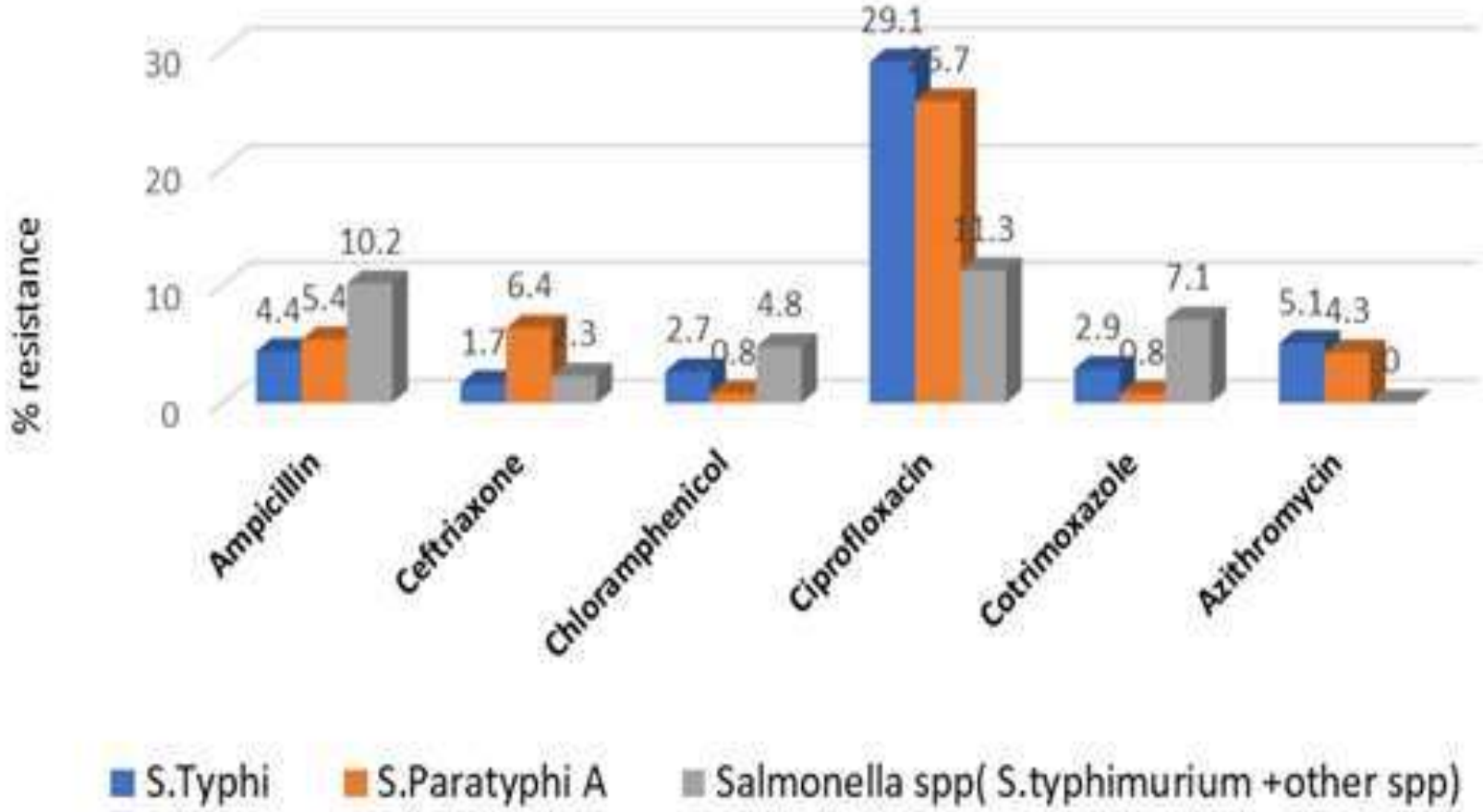
- Data from all sentinel sites are compiled, analyzed and disseminated annually

HIGHLIGHTS FROM NATIONAL **AMR** SURVEILLANCE (2019)

SALMONELLA

- A TOTAL OF 565 SALMONELLA WERE RECOVERED FROM 39,997 BLOOD CULTURES REPORTED IN 2019.
  - 64.4 % WERE SALMONELLA ENTERICA SEROVAR TYPHI (364/565),
  - 23.8 % WERE SALMONELLA ENTERICA SEROVAR PARATYPHI (135/565)
  - 9.9% (58/557) WERE SALMONELLA SPP.
- INFECTION WAS HIGHER IN MONSOON (JUNE -AUGUST)
- CASES WERE SLIGHTLY HIGHER IN FEMALES
- PATIENTS OF 11-20 YEARS AGE GROUP WERE COMMONLY AFFECTED IN BOTH SEXES.

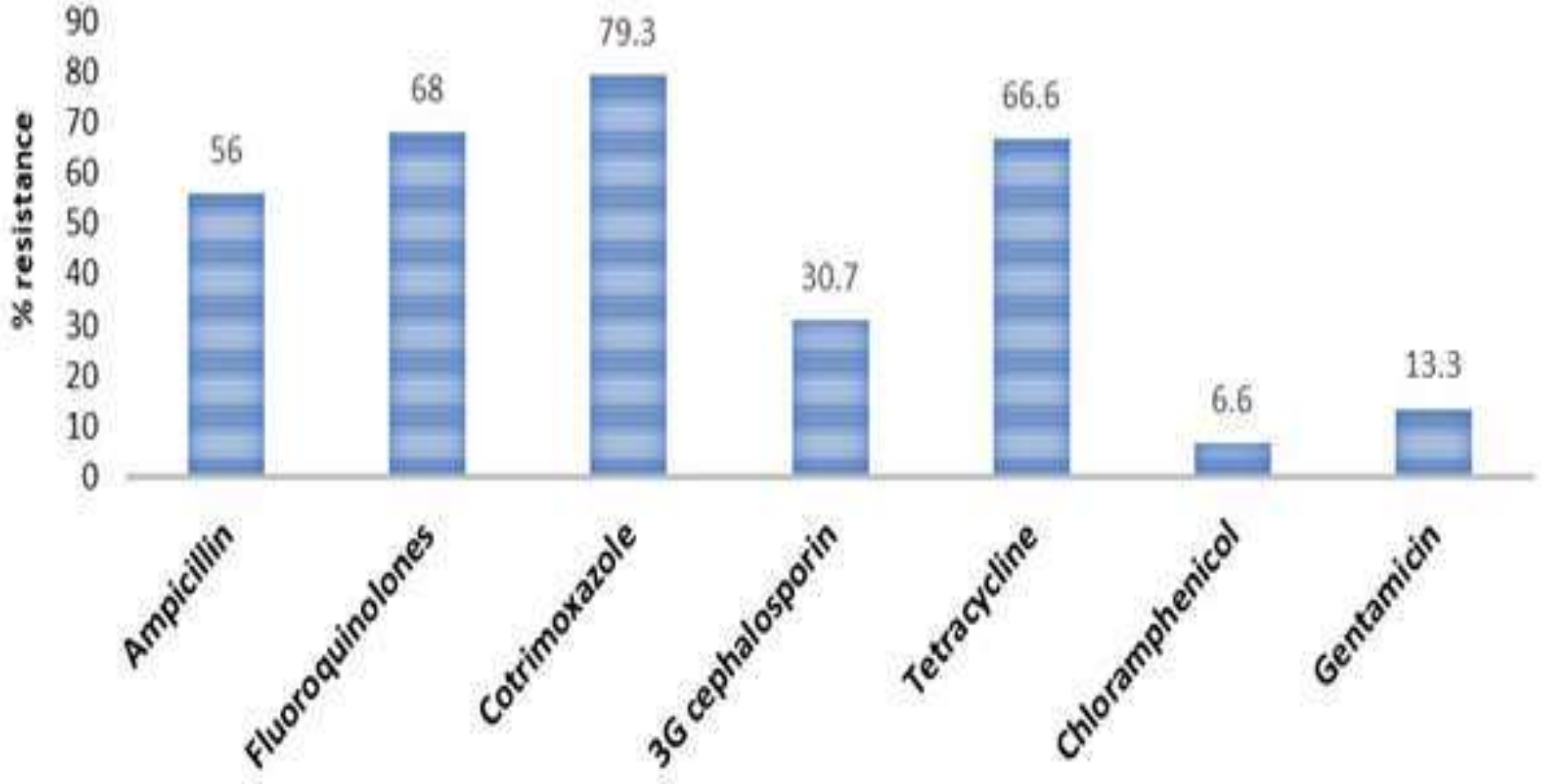
Figure 1: Comparative antibiogram of Salmonella spp,2019 (n=549)



SHIGELLA

- OUT OF 2802 STOOL CULTURES, 33 YIELDED SHIGELLA
  - *57.5% SHIGELLA* SPP
  - 21.2% *S. SONNEI*
  - *15.5% S. FLEXNERI*
  - *6.06% S. BOYDII*
- ISOLATION OF SHIGELLA WAS HIGHER IN 11-20 YEARS AGE GROUP IN BOTH SEXES
- 45.4% SHIGELLA ISOLATES WERE MDR (AT LEAST ONE AGENT IN ≥3 CLASSES OF ANTIBIOTIC)

FIGURE 2: ANTIBIOGRAM OF SHIGELLA SPP,2019 (N=33)



VIBRIO CHOLERAE

- ONLY 1 *V. CHOLERAE* O1 OGAWA WAS REPORTED IN 2019
- THE ISOLATE WAS SUSCEPTIBLE TO AMPICILLIN AND TETRACYCLINE BUT RESISTANT TO COTRIMOXAZOLE AND NALIDIXIC ACID

STREPTOCOCCUS PNEUMONIAE

- A TOTAL OF 82 *S. PNEUMONIAE* ISOLATES WERE REPORTED
- MOST OF THE ISOLATES WERE RECOVERED FROM BLOOD (34) FOLLOWED BY RESPIRATORY SAMPLE (24)
- INFECTION WAS HIGHER IN 1-15 YEARS AGE GROUP IN BOTH SEXES.
- ALL THE ISOLATES WERE SENSITIVE TO LINEZOLID AND VANCOMYCIN
- OF THE TOTAL ISOLATES, 23.1% WERE RESISTANT TO 1 ANTIBIOTIC CLASS, 19.5% WERE RESISTANT TO 2 CLASSES OF ANTIBIOTIC
- **9.7% ISOLATES WERE MDR**

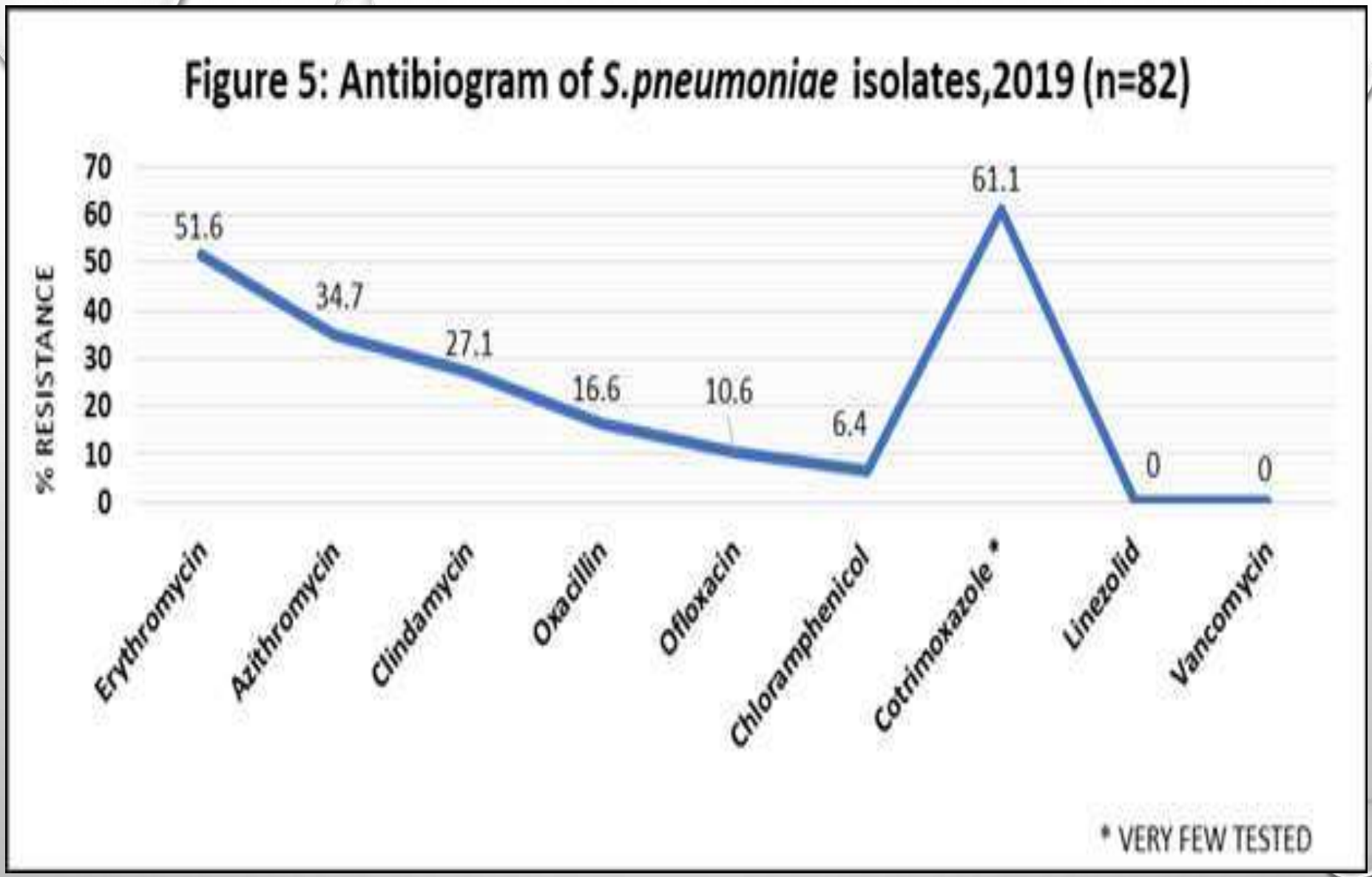
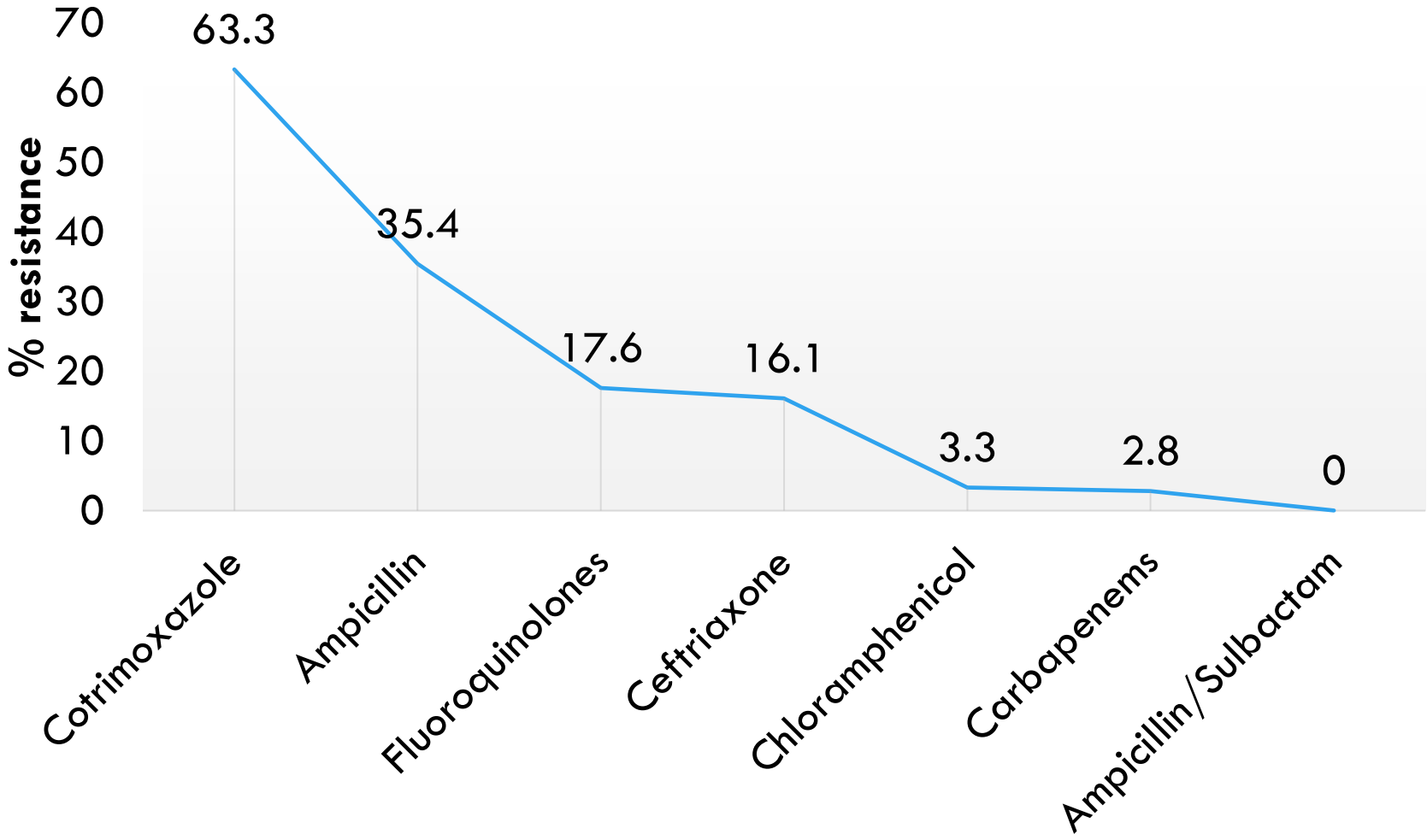


Figure 5: Antibiogram of S.pneumoniae isolates,2019 (n=82)
% RESISTANCE
70
60
50
40
30
20
10
0
51.6
34.7
27.1
16.6
10.6
6.4
61.1
0
0
Erythromycin
Azithromycin
Clindamycin
Oxacillin
Ofloxacin
Chloramphenicol
Cotrimoxazole *
Linezolid
Vancomycin
* VERY FEW TESTED

HAEMOPHILUS INFLUENZAE

- ONLY 35 ISOLATES OF H. INFLUENZAE WERE REPORTED
- SAMPLE WISE DISTRIBUTION SHOWS 88.5% WERE RECOVERED FROM RESPIRATORY SAMPLE, FOLLOWED BY 8.5% FROM PUS AND 2.8% FROM BLOOD
- ISOLATION WAS HIGHER IN 46-60 YEARS AGE GROUP IN CASE OF MALES, WHEREAS, FROM 61-75 YEARS AGE GROUP IN FEMALES
- **11.4 %** (4/35) WERE **MDR**

Figure : Antibiogram of H.influenzae isolates,2019 (n=35)



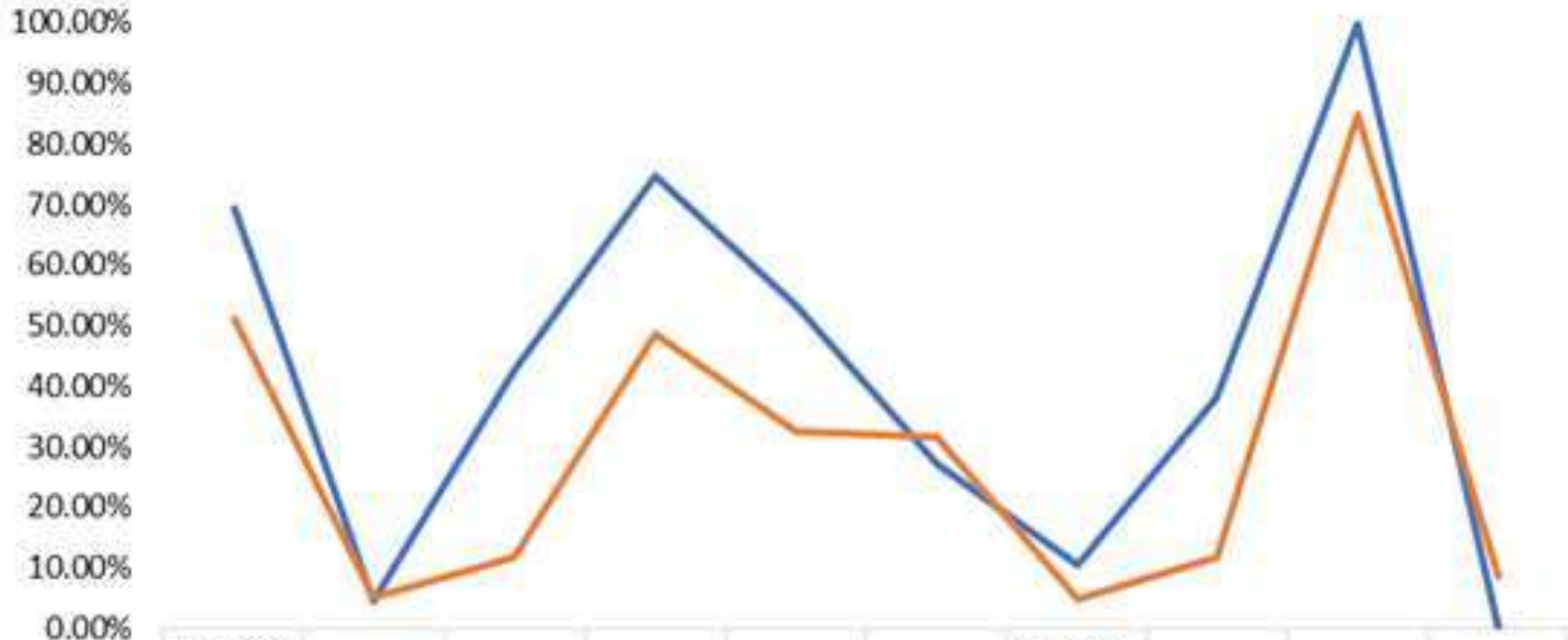
NEISSERIA GONORRHOEAE

- ONLY 14 ISOLATES OF *NEISSERIA GONORRHOEA* WERE REPORTED
- 85% ISOLATES WERE RECOVERED FROM MALES OF 15-30 YEARS AGE GROUP
- SINCE CLSI RECOMMENDS DOING MIC FOR TESTING ANTIBIOTICS AGAINST *NEISSERIA*, ONLY 4 ANTIBIOTICS WERE REPORTED
- THE ANTIBIOGRAM OF *N. GONORRHOEA* ISOLATES SHOWS
  - 71.4% (10/14) RESISTANCE TO CIPROFLOXACIN,
  - 28.5% (4/14) RESISTANCE AGAINST CEFTRIAXONE,
  - 100% RESISTANCE TO COTRIMOXAZOLE AND LEVOFLOXACIN (ONLY 4 ISOLATES TESTED)

METHICILLIN RESISTANT *S. AUREUS* (MRSA)

- A TOTAL OF 3101 *STAPHYLOCOCCUS AUREUS* WERE REPORTED IN 2019 FROM VARIOUS SAMPLES OF WHICH **943(30.4%)** WERE METHICILLIN RESISTANT
- THE PROPORTION OF MRSA RANGED BETWEEN 5.2% TO 77% DEPENDING ON SAMPLE, INSTITUTION AND CULTURE LOAD
- MRSA ISOLATES SHOWED HIGH RESISTANCE AS COMPARED TO NON-MRSA.
- HALF OF THE MRSA **(50.5%)** ISOLATES WERE **MDR**

Figure 9 : Comparative antibiogram of MRSA (n=943) vs Non MRSA isolates (n=2435)



	Macrolides (Ery/Azt)	CHL	LEV *	CIP	CD	COT	Tetracyclines * (Dox/Tet)	GM	Penicillin G*	Linezolid *
MRSA (%R)	69.50%	4.40%	42.50%	74.60%	53.40%	27.30%	10.50%	38.10%	100%	0.00%
Non-MRSA (%R)	51.20%	5.10%	11.68%	48.50%	32.60%	31.70%	4.90%	11.80%	84.70%	8.60%

MRSA (%R) Non-MRSA (%R)

ESBL *E. COLI*

- A TOTAL OF 10,984 ISOLATES OF *ESCHERICHIA COLI* WERE REPORTED FROM 15 SURVEILLANCE SITES OF WHICH ONLY 8 PERFORMED PHENOTYPIC TESTS FOR CONFIRMATION OF ESBL PRODUCTION
- PRIMARY SCREENING (RESISTANCE TO THIRD GENERATION CEPHALOSPORIN) SHOWED 9523 (86.6%) ISOLATES WERE SUSPECTED ESBL PRODUCERS, WHEREAS ONLY 620 (5.6%) ISOLATES WERE PHENOTYPICALLY CONFIRMED AS ESBL PRODUCERS
- MOST OF THE ISOLATES WERE RECOVERED FROM URINE (80%) OF WHICH 6.5% WERE ESBL POSITIVE
- MOST OF THE ISOLATES WERE RECOVERED FROM FEMALES OF 21-30 YEARS AGE GROUP WHEREAS IN MALE RECOVERY RATE WAS HIGHER IN 51-60 YEARS AGE GROUP

MDR *KLEBSIELLA SPP*

- A TOTAL OF 3374 *KLEBSIELLA* ISOLATES WERE REPORTED
- OF THE TOTAL ISOLATES, 1201 **(35.5%)** WERE **MDR**

Figure 16: Comparative Antibiogram of *Klebsiella* spp

	Amino glycosides	Beta lactam combination	Fluoro quinolones	Carba penems	Tetracyclines	Chloramphenicol	Cotrimoxazole	Nitrofurantoin *	Cephalosporin
Non MDR Klebsiella	32.6	45.7	38.8	27.3	59.5	50.7	49.4	39.9	60.9
MDR Klebsiella	64.1	78.1	88.04	57.01	71.4	71.1	90.4	78.1	96.7

Non MDR Klebsiella MDR Klebsiella

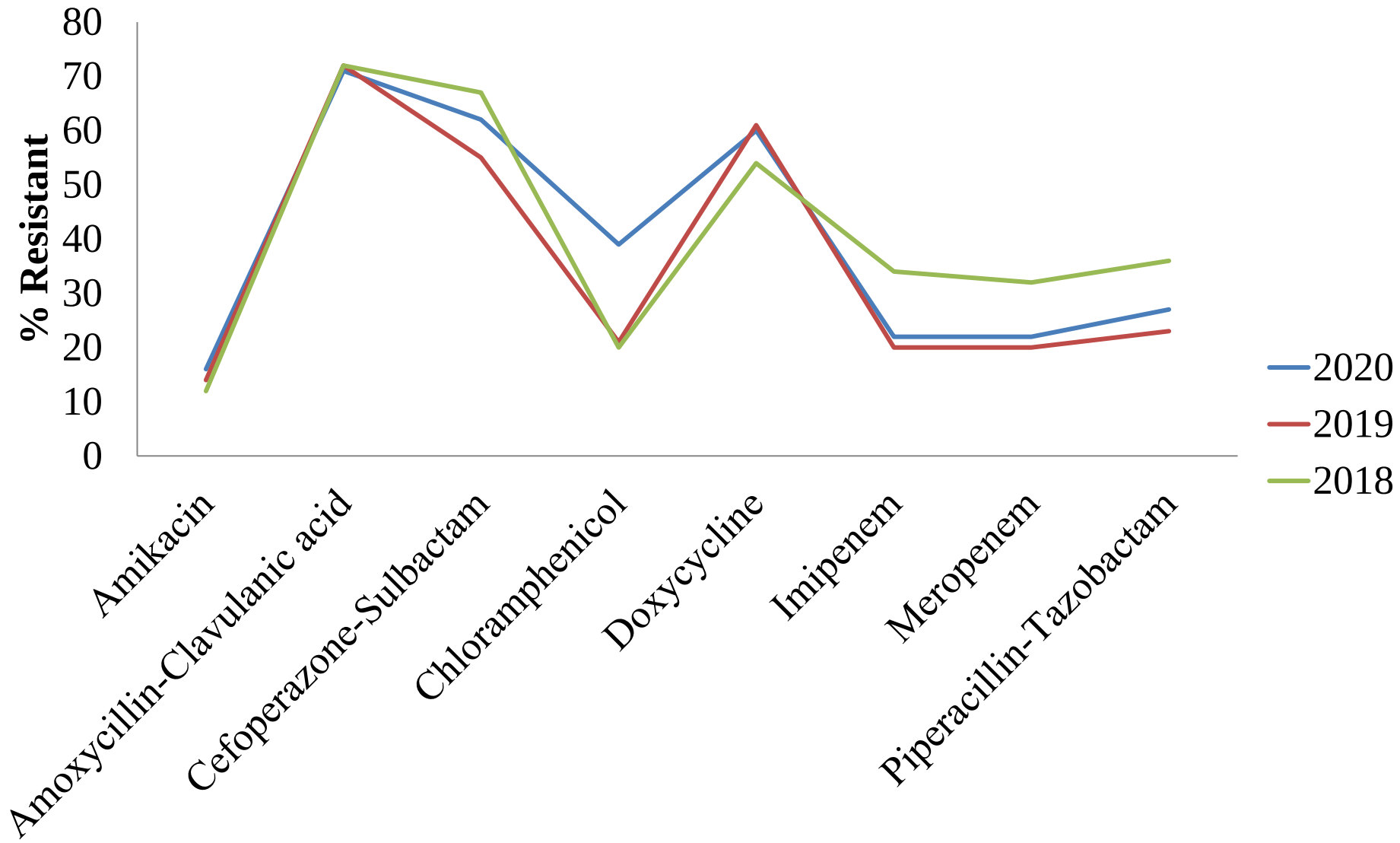
MDR *ACINETOBACTER SPP*

- A TOTAL OF 1546 ACINETOBACTER SPP WERE REPORTED
- **496 (32.8%)** WERE **MDR**
- MDR ISOLATES WERE HIGHLY RESISTANT TO ALL TESTED ANTIBIOTICS AS COMPARED TO NON-MDR ISOLATES

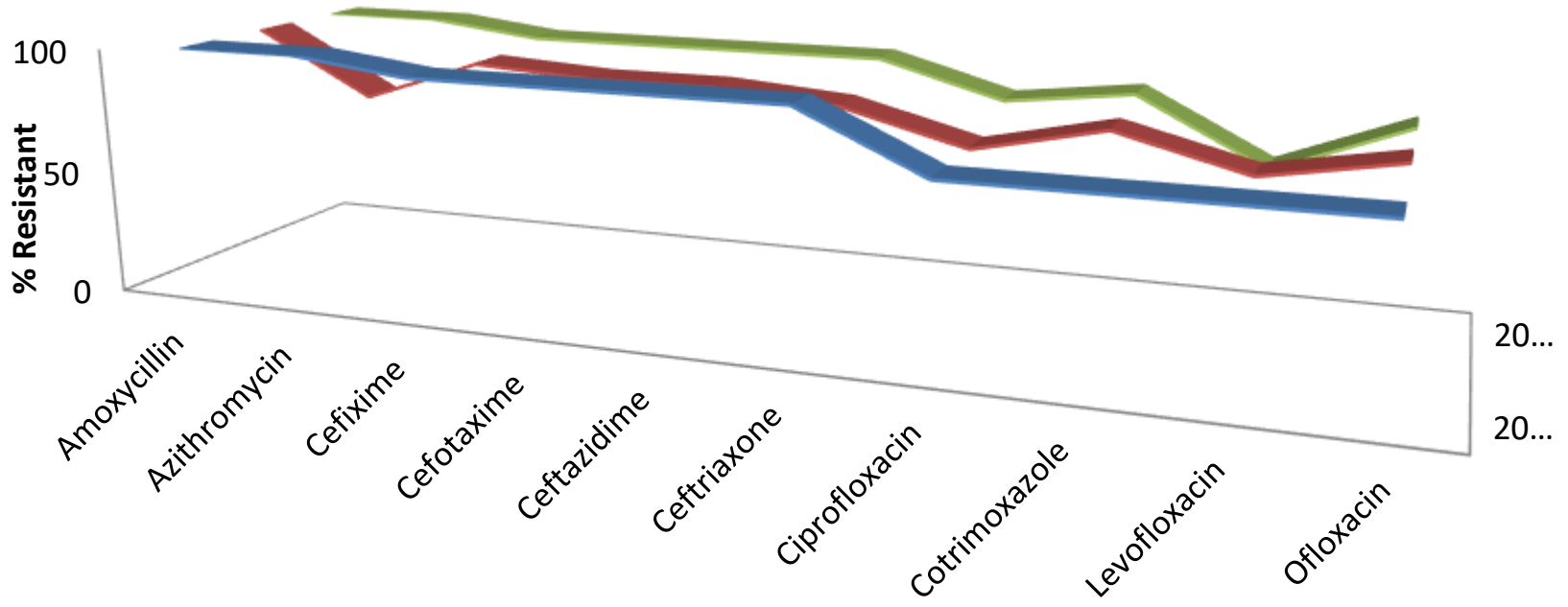
Figure 19: Comparative antibiogram of MDR and non MDR *Acinetobacter spp*

	Aminoglycosides	Beta lactam combination	Fluoroquinolones	Carbapenems	Tetracyclines	Cotrimoxazole	Nitrofurantoin *	Cephalosporin
Non-MDR Acinetobacter	37.8	35.1	39.5	30.5	79.6	50.5	55.8	72.5
MDR Acinetobacter	90.1	83.8	95.8	87.3	66.2	88.5	92.3	96.8

AMR trends of E. coli (Kathmandu Model Hospital)



3 years AMR trends of ACBC (Kathmandu Model Hospital)



	Amoxycillin	Azithromycin	Cefixime	Cefotaxime	Ceftazidime	Ceftriaxone	Ciprofloxacin	Cotrimoxazole	Levofloxacin	Ofloxacin
2020	100	100	94	94	94	94	71	71	71	71
2019	100	74	91	88	88	84	71	82	69	78
2018	100	100	94	94	94	94	80	86	60	80

CONSTRAINTS TO REDUCING AMR IN NEPAL

- LACK IN COMMUNICATION BETWEEN HUMAN HEALTH, VETERINARY AND OTHER SECTORS
- LACK OF REGULATORY BODIES
- NO STRICT LAW AGAINST VIOLATORS
- LACK OF GOOD INFRASTRUCTURE AND DEDICATED HUMAN RESOURCE
- LACK OF A NATIONAL LMIS

TAKE HOME MESSAGES

- BACTERIAL RESISTANCE MIGHT BE THE MAJOR HEALTH PROBLEM AHEAD
- IT'S AN GLOBAL **ECOLOGICAL** PHENOMENOM
- NO PART OF THE WORLD WILL BE SPARED
- FIRST DECREASE MASSIVELY ALL UNNECESSARY ANTIBIOTIC USAGE

TAKE HOME MESSAGES

- **HOWEVER,** LET'S NOT BE TOO PESSIMISTIC
- THE SITUATION OF AMR IS HIGHLY CRITICAL
- BUT
  - WE CAN (AT LEAST) STABILIZE AMR BY REDUCING MISUSE AND OVERUSE OF ANTIBIOTICS
  - UNTIL NEW DRUGS AND TREATMENTS EMERGE IN THE MARKET

DISCUSSION QUESTIONS

- WHAT IS MULTIDRUG RESISTANCE? WHAT ARE THE CHALLENGES WE FACE WITH MULTIDRUG RESISTANCE?
- WHAT ARE SOME OF THE RISKS ASSOCIATED WITH AMR/MDR?
- WHY IS IT IMPORTANT TO UNDERSTAND PATTERNS OF RESISTANCE IN DIFFERENT PATHOGENS?

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

MODULE 4: ADDRESSING AMR

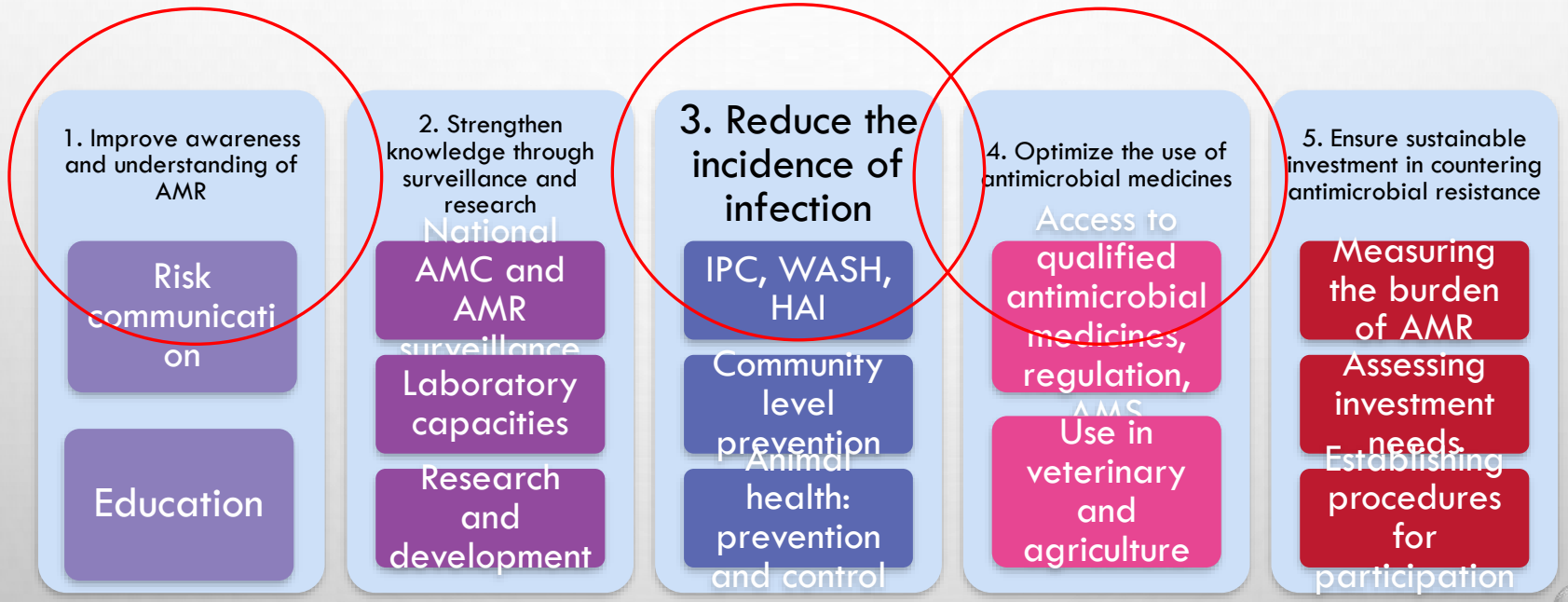
MODULE 4 OBJECTIVES

- TO UNDERSTAND THE GLOBAL AND NATIONAL RESPONSE TO AMR THROUGH AMR ACTION PLANS
- INCREASE KNOWLEDGE ABOUT HOW ANTIBIOTIC USE CAN BE CHANGED TO DECREASE RISKS OF AMR
- INCREASE KNOWLEDGE ABOUT AWARE CATEGORIES OF ANTIBIOTICS AND WHAT THESE CATEGORIES MEAN IN RELATION TO RESISTANCE
- INCREASE KNOWLEDGE ABOUT AMR STEWARDSHIP

A SOCIAL AND ECONOMIC ASSESSMENT OF ANTIBIOTIC DISPENSING PRACTICES AMONG COMMUNITY-BASED PHARMACISTS

- EVIDENCE SUGGESTS THAT A MAJORITY OF MULTI-DRUG RESISTANT (MDR) PATHOGENS ARE IN THE ENVIRONMENTS AND THESE INFECTIONS ARE OFTEN COMMUNITY ACQUIRED;
- GLOBAL DATA SUGGEST THAT **85% TO 95%** OF ANTIBIOTIC DISPENSING OCCURS WITHIN COMMUNITIES;

GLOBAL AND NATIONAL ACTION PLANS



AWARENESS AND UNDERSTANDING

- ANTIBIOTICS ARE **KEY TO TREATMENT OF CERTAIN BACTERIAL INFECTIONS** (E.G., URINARY TRACT INFECTIONS, STREP THROAT)
- ANTIBIOTICS **MAY NOT BE NEEDED FOR SOME BACTERIAL INFECTIONS** (E.G., EAR OR SINUS INFECTIONS)
- ANTIBIOTICS SHOULD **NEVER BE USED FOR VIRAL INFECTIONS**
    - COLDS
    - INFLUENZA
    - COVID 19

PHARMACY AMS TRAINING 2021

https://www.cdc.gov/antibiotic-use/community/about/should-know.html

OPTIMIZING USE OF ANTIBIOTICS

- WHAT IS AWARE?
  - THE WHO HAS CLASSIFIED COMMONLY USED ANTIBIOTICS INTO THREE GROUPS: **ACCESS, WATCH, RESERVE**
    - **ACCESS**: THIS GROUP INCLUDES ANTIBIOTICS AND ANTIBIOTICS CLASSES THAT HAVE ACTIVITY AGAINST A WIDE RANGE OF COMMONLY ENCOUNTERED SUSCEPTIBLE PATHOGENS. THESE ARE ESSENTIAL FIRST- AND SECOND-CHOICE EMPIRICAL TREATMENT OPTIONS FOR SPECIFIC INFECTIOUS SYNDROMES E.G., AMOXICILLIN, AMPICILLIN, CEFALEXIN, CHLORAMPHENICOL, CLOXACILLIN, DOXYCYCLINE, SULFAMETHOXAZOLE + TRIMETHOPRIM
    - **WATCH**: THIS GROUP INCLUDES ANTIBIOTICS AND ANTIBIOTIC CLASSES THAT HAVE A HIGHER RESISTANCE POTENTIAL. THESE ARE ESSENTIAL FIRST AND SECOND-CHOICE EMPIRICAL TREATMENT OPTIONS FOR A LIMITED NUMBER OF INFECTIOUS SYNDOMES, E.G., **AZITHROMYCIN, CEFIXIME, CEFOTAXIME CIPROFLOXACIN, VANCOMYCIN**
    - **RESERVE:** THIS GROUPS SHOULD BE RESERVED FOR CONFIRMED OR SUSPECTED MULTIDRUG RESISTANT ORGANISMS. **THEY SHOULD BE CONSIDERED LAST RESORT OPTIONS**. E.G., CEFTAZIDIME + AVIBACTAM COLISTIN FOSFOMYCIN (INTRAVENOUS) LINEZOLID MEROPENEM + VABORBACTAM PLAZOMICIN POLYMYXIN B

OPTIMIZING USE OF ANTIBIOTICS

- **IT IS IMPORTANT FOR PHYSICIANS TO FOLLOW CERTAIN GUIDELINES WHEN THEY PRESCRIBE ANTIBIOTICS**
  - DO NOT OVERPRESCRIBE ANTIBIOTICS (E.G., FEVER WITHOUT EVIDENCE OF INFECTION)
  - SAVE USE OF BROAD SPECTRUM ANTIBIOTICS [AWARE CATEGORIES FOR ANTIBIOTICS]
  - TAKE CARE WITH DOSING AND DURATION. BOTH OVER AND UNDER RECOMMENDED DOSING AND DURATION CAN CONTRIBUTE TO RESISTANCE
  - FOLLOW RECOMMENDATIONS/GUIDELINES IN TERMS OF DOSE INTERVALS (E.G., TOO MUCH TIME BETWEEN DOSES)

A SOCIAL AND ECONOMIC ASSESSMENT OF ANTIBIOTIC DISPENSING PRACTICES AMONG COMMUNITY-BASED PHARMACISTS IN KATHMANDU VALLEY

AB	#1 sold	#2 sold	#3 sold	Not listed
Cefixime*	33.3% (6)	27.8% (5)	33.3% (6)	5.6% (1)
Azithromycin*	5.6% (1)	22.2% (4)	50.0% (9)	22.2% (4)
Amoxicillin	38.9% (7)	33.3% (6)	5.6% (1)	22.3% (4)
Ciprofloxacin*	11.1% (2)	5.6% (1)	5.6% (1)	77.8% (14)
Ampicillin	11.1% (2)	11.1% (2)	0	77.8% (14)
Cephalixin	0	0	5.6% (1)	94.4% (17)
	*Listed under “Watch” in WHO antibiotic AWaRE classification			

ANTIMICROBIAL STEWARDSHIP

- THERE ARE MANY EVIDENCE-BASED AMS INTERVENTIONS
- **EDUCATION**
  - **FORMAL/ INFORMAL**
  - **GUIDELINES**
- FEEDBACK
  - AUDIT WITH FEEDBACK
  - WARD ROUNDS
- STRUCTURE
  - SELF-REVISION BY PRESCRIBER
  - COMPUTERIZED ORDER ENTRY
- RESTRICTION
  - PRE-AUTHORIZATION
  - AUTOMATIC STOP ORDERS

DISCUSSION QUESTIONS

- WHAT ARE KEY WAYS FOR PHYSICIANS TO OPTIMIZE THE USE OF ANTIBIOTICS?
- WHAT ARE THE AWARE CATEGORIES AND HOW CAN THEY HELP TO DECREASE ANTIMICROBIAL RESISTANCE?

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

MODULE 5 : ANTIBIOTIC GUIDELINES FOR COMMUNITY PHARMACISTS & OTC MEDICATIONS

Dr. Abhinav Dahal
Dr. Muna Palikhe
Kathmandu Model Hospital

MODULE 5 OBJECTIVES

- INCREASE UNDERSTANDING OF BARRIERS TO OPTIMAL ANTIBIOTIC USE
- REVIEW OF OTC MEDICINES WHICH CAN BE USED TO TREAT COMMON SYMPTOMS
- INCREASE UNDERSTANDING OF RISKS ASSOCIATED WITH ANTIBIOTIC USE IN CHILDREN AND ADULTS
- REVIEW OF ANTIBIOTICS WHICH MIGHT BE PRESCRIBED BY PHYSICIANS FOR COMMON COMMUNITY ILLNESSES

BEHAVIOR CHANGE: NECESSARY TO REDUCE AMR

Pharmacists are uniquely placed to initiate behaviour change

- PHARMACISTS ARE FRONTLINE WORKERS WHO ARE EXTREMELY ACCESSIBLE TO PATIENTS
- THERE ARE TWO MAIN PROPOSED BARRIERS TO APPROPRIATE ANTIBIOTIC USE IN THE COMMUNITY

The Problem (1):
The pressure to prescribe/provide antibiotics to patients, despite the presence of viral infections and the high patient expectation of receiving antibiotics

Behavior Change Proposed:
To ensure health care providers have the necessary resources to provide alternative symptomatic relief to patients

The solution: An alternative 'prescription' for symptomatic relief, containing information about viral infections, appropriate prescribing and alternative symptomatic relief treatments based on patients' symptoms

COMMON RECOMMENDATIONS FOR SYMPTOM MANAGEMENT IN ADULTS

Symptoms	Home remedies	Over the counter medication (Adults only)	Active ingredient (Common brand names)
Stuffy nose	Vaporizer or humidifier	-Saline nasal spray -Oral Decongestant: opens up nasal passages (avoid if you have high blood pressure)	□ Saline □ Phenylephrine □ Pseudoephedrine
Runny nose; itchy, watery eyes; sneezing	-For red, raw nose, put petroleum jelly on the exterior -Use tissue with lotion - Avoid smoke	Antihistamine: dries you up and may relieve itchy eyes	□ Diphenhydramine □ Chlorpheniramine □ Loratadine □ Cetirizine □ Fexofenadine
Dry cough	Vaporizer or humidifier	Cough suppressant: helps stop cough	□ Dextromethorphan
Wet cough	Drink more fluids	Expectorant: thins mucus, makes it easier to cough up	□ Guaifenesin
Sore throat	-Gargle with warm salt water -Avoid smoke -Drink tea	Throat lozenges: soothes throat (choose a sugar-free option if you have diabetes)	□ Menthol or Benzocaine
Fever, muscle aches	-Bed rest -Cool or warm compresses	Analgesic: pain reliever (use caution if you are taking blood thinners)	□ Acetaminophen □ Aspirin □ Ibuprofen Naproxen

BEHAVIOR CHANGE: NECESSARY TO REDUCE AMR

Pharmacists are uniquely placed to initiate behaviour change

- COMMUNITY PHARMACISTS ARE FRONTLINE WORKERS WHO ARE EXTREMELY ACCESSIBLE TO PATIENTS
- THERE ARE TWO MAIN PROPOSED BARRIERS TO APPROPRIATE ANTIBIOTIC USE IN THE COMMUNITY

The Problem (2):
A lack of knowledge and awareness of appropriate antibiotic use among clinicians and patients can drive inappropriate antibiotic use

Behavior Change Proposed:
Ensuring nurses and midwives counsel the patients on responsible antibiotic use and when dispensing antibiotics utilize guidelines

The solution: Raising awareness about AMR, appropriate antibiotic use, and the need to have strict adherence to prescription-only antibiotics or when they are indicated

WHEN ARE ANTIBIOTICS INDICATED? EXAMPLE OF PATIENT INFORMATION

Common Condition	Common Cause			
	Bacteria	Bacteria or Virus	Virus	Are Antibiotics Needed?
Strep Throat	✔			Yes
Urinary tract infection	✔			Yes
Sinus Infection (sinusitis)		✔		Maybe
Ear Infection		✔		Maybe
Bronchitis/chest cold		✔		No
Common cold/runny nose			✔	No
Sore throat			✔	No
Flu			✔	No

ANTIBIOTIC USE IN CHILDREN: PROCEED WITH CAUTION!

- ANTIBIOTIC SELECTION, DOSAGES, AND DURATIONS OF TREATMENT ARE DIFFERENT FOR CHILDREN!
- SEVERAL ANTIBIOTICS ARE ASSOCIATED WITH HARM IN CHILDREN, SUCH AS:
  - PERMANENT TEETH DISCOLORATION
  - GASTRO-INTESTINAL DYSFUNCTION
  - ALLERGIC REACTIONS
    - HIVES/RASH
    - SHORTNESS OF BREATH/WHEEZING
    - **ANAPHYLAXIS**
- IN CASES WHERE CHILDREN MIGHT REQUIRE ANTIBIOTICS, IT IS HIGHLY RECOMMENDED THEY SEE A DOCTOR

ALLERGIC REACTIONS TO ANTIBIOTICS

- **DELAYED REACTIONS RESULTING FROM PENICILLIN ALLERGY. LESS-COMMON PENICILLIN ALLERGY REACTIONS OCCUR DAYS OR WEEKS AFTER EXPOSURE TO THE DRUG AND MAY PERSIST FOR SOME TIME AFTER YOU STOP TAKING IT. THESE CONDITIONS INCLUDE:**
  - **SERUM SICKNESS**, WHICH MAY CAUSE FEVER, JOINT PAIN, RASH, SWELLING AND NAUSEA
  - **DRUG-INDUCED ANEMIA**, A REDUCTION IN RED BLOOD CELLS, WHICH CAN CAUSE FATIGUE, IRREGULAR HEARTBEATS, SHORTNESS OF BREATH, AND OTHER SIGNS AND SYMPTOMS
  - **DRUG REACTION WITH EOSINOPHILIA AND SYSTEMIC SYMPTOMS (DRESS)**, WHICH RESULTS IN RASH, HIGH WHITE BLOOD CELL COUNTS, GENERAL SWELLING, SWOLLEN LYMPH NODES AND RECURRENCE OF DORMANT HEPATITIS INFECTION
  - **STEVENS-JOHNSON SYNDROME OR TOXIC EPIDERMAL NECROLYSIS**, WHICH INVOLVES SEVERE BLISTERING AND PEELING OF THE SKIN
  - **INFLAMMATION IN THE KIDNEYS (NEPHRITIS)**, WHICH CAN CAUSE FEVER, BLOOD IN THE URINE, GENERAL SWELLING, CONFUSION, AND OTHER SIGNS AND SYMPTOMS

Mayo Clinic. Penicillin Allergies. Available at: https://www.mayoclinic.org/diseases-conditions/penicillin-allergy/symptoms-causes/syc-20376222

GUIDELINES FOR PHYSICIANS

COMMON COMMUNITY-ACQUIRED ILLNESSES

LOWER RESPIRATORY TRACT INFECTIONS (ADULTS)

Diagnosis	Suspected Pathogens	Empiric treatment	Duration of Therapy
Pneumonia, community-acquired	*S. Pneumoniae* *H. influenzae* *Mycoplasma* sp. *Chlamydophila* sp. *Legionella* sp.	• Amoxiclav PO 625mg q8h <u>Alternatives:</u> • Moxifloxacin PO 400 q24h • Azithromycin PO 500 mg q24h	• 5 days with symptom resolution

SKIN AND SKIN STRUCTURE INFECTIONS (ADULTS)

Diagnosis	Suspected Pathogens	Empiric treatment	Duration of Therapy
Skin and skin structure infections Cellulitis, no abscess	Streptococci	<u>Cellulitis, oral therapy</u>: • Cephalexin 500mg q6h <u>Alternatives</u> • Cloxacillin 500mg q8h or Flucloxacillin PO 500mg q6	• 5-7 days

SKIN AND SKIN STRUCTURE INFECTIONS (ADULTS)

Diagnosis	Suspected Pathogens	Empiric treatment	Duration of Therapy
Abscess, with drainage	Staphylococci, MRSA or MSSA	• Doxycycline PO 100 mg q12h • Amoxiclav PO 625mg q8h • Clindamycin PO 300 mg q 8h <u>Alternatives</u> • Flucloxacillin PO 500mg q6hr Cotrimoxazole PO 800/160 mg q12h	• 5 days, with adequate surgery for drainage

URINARY TRACT INFECTIONS (ADULTS)*

Diagnosis	Suspected Pathogens	Empiric treatment	Duration of Therapy
Lower urinary tract Urinary discomfort, no fevers, generally younger women	*E. Coli* Other *Enterobacterales*	• Nitrofurantoin PO 100 mg q6hr • Pregnant women ONLY: Cefixime PO 400mg q6h <u>Alternatives:</u> • See below recommendations	• 5 days • 7 days • 3 days for either drug
Upper urinary tract infection Fevers, upper kidney pain		• Ciprofloxacin PO 500 mg q 12 h, or • Cotrimoxazole PO 800/160 mg q12h	• 7 days for either drug

**E. coli* are often multi-drug resistant organisms. Lack of response to antibiotic treatment could warrant additional testing for resistance

DISCUSSION QUESTIONS

- WHAT ARE SOME CONDITIONS FOR WHICH ANTIBIOTICS SHOULD NOT BE PRESCRIBED/DISPENSED?
- HOW CAN DISPENSING OVER-THE-COUNTER SYMPTOM RELIEF MEDICATIONS HELP TO DECREASE ANTIBIOTIC RESISTANCE?
- WHAT ARE RISKS ASSOCIATED WITH ANTIBIOTIC USE AMONG INFANTS AND CHILDREN?

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

MODULE 6 : TALKING TO CLIENTS AND CASE STUDIES

Dr. Sameer Mani Dixit
Director Of Research CMDN

MODULE 6 OBJECTIVES

- INCREASE POSITIVE WAYS OF COMMUNICATING WITH CLIENTS ABOUT ANTIBIOTIC USE
- USE CASE STUDIES TO DETERMINE BEST TREATMENTS FOR SYMPTOMS AND MEANS OF COUNSELING CLIENTS

TALKING TO YOUR CLIENTS ABOUT ANTIBIOTICS

- **VALIDATE SYMPTOMS AND PROVIDE SYMPTOMATIC TREATMENT RECOMMENDATIONS:** NEVER USE THE PHRASE: "IT'S JUST A VIRUS." IT MAKES PATIENTS FEEL YOU ARE NOT UNDERSTANDING AND EMPATHIC. INSTEAD SOME STATEMENTS MIGHT INCLUDE:
  - "YOUR SYMPTOMS ARE DUE TO A VIRAL INFECTION THAT WON'T RESPOND TO ANTIBIOTICS"
  - "VIRAL INFECTIONS ARE OFTEN AS PAINFUL AS BACTERIAL INFECTIONS. I WOULD LIKE TO PROVIDE YOU WITH TREATMENT RECOMMENDATIONS THAT CAN HELP YOU FEEL BETTER".
- **TAKE YOUR TIME:** SAYING SOMETHING LIKE: "I'M IN NO HURRY, LET'S TALK MORE ABOUT HOW WE CAN MAKE YOU FEEL BETTER." TAKING A BIT MORE TIME TO EDUCATE THE CLIENT ON ANTIBIOTIC STEWARDSHIP MAY IMPROVE CLIENT SATISFACTION.

TALKING TO YOUR CLIENTS ABOUT ANTIBIOTICS

- **POINT TO A "HIGHER POWER" AND/OR RECOMMEND THEY GO TO A CLINIC**: SOME CLIENTS MAY RESPOND TO INFORMATION THAT SUGGESTS THAT LARGER ORGANIZATIONS (MOH OR DDA) SUPPORT THE NEED FOR A PHYSICIAN PRESCRIPTION FOR ANTIBIOTICS.
    - "ANTIBIOTIC RESISTANCE IS A SERIOUS HEALTH CONCERN IN NEPAL. MANY NATIONAL AND INTERNATIONAL HEALTH ORGANIZATIONS RECOMMEND THAT ANTIBIOTICS ONLY BE GIVEN WITH A PHYSICIAN PRESCRIPTION."
- **EXPRESS CONCERN, EVEN WHEN A CLIENT IS UPSET**: LISTEN TO YOUR CLIENT'S CONCERNS AND ADDRESS THOSE SPECIFIC CONCERNS. THINK ABOUT HOW YOU WOULD WANT SOMEONE TO TALK TO YOU OR YOUR FAMILY MEMBER WHEN SOMEONE IS SICK.
- **BE SUPPORTIVE AND RECOMMEND NEXT STEPS**: REMINDING A CLIENT THAT YOU WANT TO DO WHAT IS BEST FORM THEM AND GIVE THEM A BACK UP PLAN.
    - I KNOW YOU ARE CONCERNED ABOUT HOW YOU ARE FEELING. I SUGGEST THAT YOU TRY THE MEDICATIONS I GIVE YOU AND IF YOU DON'T FEEL BETTER IN A FEW DAYS I WOULD RECOMMEND YOU GO TO THE CLINIC."

PATIENT CASE 1

52-year-old man

Problem: Sore throat, cough with mild pain

Background: The patient has complained of a sore throat for almost a week. He has had several similar episodes in the past, but now presents with a cough.

Setting: The patient enters your pharmacy requesting antibiotics for his sore throat and cough. He has not tried any other treatment or therapy for his sore throat, but is concerned this has developed into an infection.

He does not report any fevers or other symptoms suggestive of a severe condition. He wants to purchase an antibiotic course today.

Question 1. Based on the patient's presentation, what is the likely cause of his condition?

Question 2. What treatment recommendations can you provide at this time?

Question 3. Given your recommendations, what education/monitoring plan do you have for this patient?

01/10/2021

PATIENT CASE 2

27-year-old mother presents with 5-year-old daughter

Problem: Child presents with stuffy nose and headache

Background: Per the mother, the child has had symptoms for about 5 days.

Setting: The mother is concerned that her child has a bacterial infection, based on her congested nose and headache with mild pain. The mother asks you which antibiotic would be best for the child.

The child does not seem to be in acute distress upon your review.

Question 1. Based on the patient's presentation, what is the likely cause of the child's condition?

Question 2. What treatment recommendations can you provide at this time?

Question 3. Given your recommendations, what education/monitoring plan do you have for this patient?

PATIENT CASE 3

36-year-old woman

Problem: Urinary discomfort

Background: The patient reports complaints of increased urination and frequency over the past two days.

Setting: The patient reports no fevers, although she hasn't taken her temperature. She has no reports of severe abdominal pain, either. She is unfortunately not able to be seen at a doctor's clinic within a reasonable timeframe. She has no other pertinent chronic health conditions, but recently use antibiotics a few months ago for a cough. She does not think she is pregnant.

She is asking you for recommendations to relieve her symptoms.

Question 1. Based on the patient's presentation, what is the likely cause of her condition?

Question 2. What treatment recommendations can you provide at this time?

Question 3. Given your recommendations, what education/monitoring plan do you have for this patient?

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

MODULE 7 : INFECTION PREVENTION AND CONTROL (IPC)

Mr. Bibek Shrestha

MODULE 7 OBJECTIVES

- UNDERSTANDING WHAT INFECTION PREVENTION AND CONTROL ENTAILS AND WHY IT IS IMPORTANT
- INCREASE KNOWLEDGE ABOUT HOW TO IMPLEMENT IPC IN YOUR WORK PLACE
- UNDERSTAND THE IMPORTANCE OF HAND HYGIENE
- INCREASE KNOWLEDGE OF RISKS OF ENVIRONMENTAL CONTAMINATION AND HOW TO ADDRESS THOSE RISKS

WHAT IS INFECTION PREVENTION AND CONTROL (IPC)?

INFECTION PREVENTION AND CONTROL (IPC) IS A SCIENTIFIC APPROACH AND PRACTICAL SOLUTION DESIGNED TO PREVENT HARM CAUSED BY INFECTIONS IN HEALTHCARE FACILITIES AND COMMUNITIES

IPC

WHY IS IPC IMPORTANT?

- ANTIBIOTIC RESISTANCE IS INCREASING
- MULTI-DRUG RESISTANT ORGANISMS CAN BE SPREAD IN COMMUNITIES
- DATA IN NEPAL SUGGESTS THAT MANY MULTI-DRUG RESISTANT INFECTIONS ARE COMMUNITY-ACQUIRED
- IT IS IMPORTANT TO HAVE MEASURES IN PLACE TO STOP THE SPREAD OF INFECTION IN COMMUNITIES

INFECTION PREVENTION STRUCTURE

KEY COMPONENTS

- **PRACTICING** GOOD IPC IN THE WORKPLACE (PHARMACY)
- **SUPPORT** FROM THE PHARMACY MANAGER/OWNER
- **EDUCATION** OF ALL EMPLOYEES
- **OUTREACH** TO DECREASE INFECTION RISKS IN THE COMMUNITY.

INFECTION PREVENTION STRUCTURE

PRACTICING IPC

- IDENTIFY STRATEGIES TO PREVENT INFECTIONS
- MAKE RECOMMENDATIONS FOR NEW PROCEDURES
- IMPLEMENT NEW PROCEDURES

SUPPORTING IPC AND EDUCATION

- IDENTIFY STRATEGIES TO COMMUNICATE ABOUT IPC TO OTHERS IN THE WORKPLACE
- PROVIDE OPPORTUNITIES FOR EVERYONE TO LEARN ABOUT IPC
- ADDRESS NEW IPC ISSUES AS THEY ARISE

INFECTION PREVENTION STRUCTURE

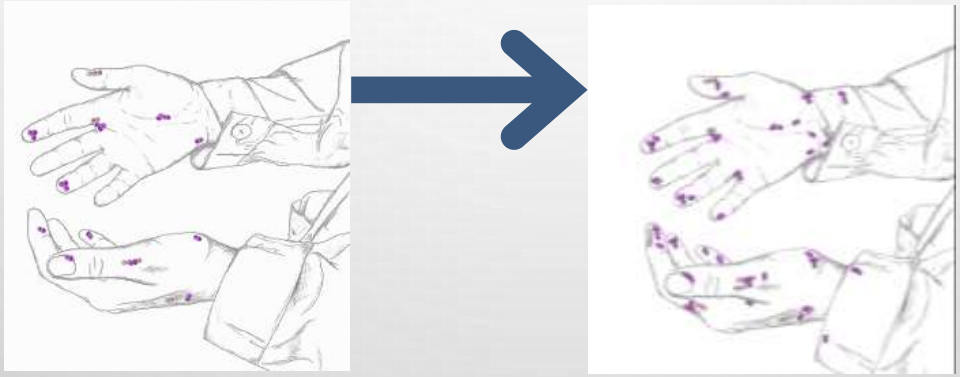
IPC AND AMS OUTREACH

- INFORMATIONAL POSTERS FOR BOTH IPC AND AMS AT THE PHARMACY
- CONVERSATIONS WITH CLIENTS ABOUT IPC (E.G., WEARING MASKS, SANITIZING/HAND WASHING) AND AMS (E.G., NOT USING ANTIBIOTICS FOR VIRAL INFECTIONS, SUGGESTING USE OF OTHER MEDICATIONS (E.G., FEVER REDUCING OTCS)
- CONVERSATIONS WITH PEERS (OTHER PHARMACISTS, HEALTH CARE PROVIDERS) TO SUPPORT LARGER IPC AND AMS OUTREACH IN YOUR COMMUNITY

IPC

THE POWER TO CONTROL INFECTION IS IN OUR HANDS

GERMS SURVIVE ON HANDS THAT ARE NOT PROPERLY WASHED AND THEN MULTIPLE



HAND HYGIENE IN THE COMMUNITY

- ABOUT 1.8 MILLION CHILDREN UNDER THE AGE OF 5 DIE EACH YEAR FROM DIARRHEAL DISEASES AND PNEUMONIA, THE TOP TWO KILLERS OF YOUNG CHILDREN AROUND THE WORLD [8].
- HANDWASHING IN THE COMMUNITY WITH SOAP COULD PROTECT **ABOUT 1 OUT OF EVERY 3 YOUNG CHILDREN WHO GET SICK WITH DIARRHEA [2, 3] AND ALMOST 1 OUT OF 5 YOUNG CHILDREN WITH RESPIRATORY INFECTIONS LIKE PNEUMONIA [3, 5].**

US Center for Disease Control. Available at https://www.cdc.gov/handwashing/why-handwashing.html

THE POWER TO CONTROL INFECTION IS IN OUR HANDS

HOW GERMS ARE SPREAD THROUGH OUR HANDS

- Touching your eyes, nose, and mouth with unwashed hands
- Prepare or eat food and drinks with unwashed hands
- Touch a contaminated surface or objects
- Blowing your nose, coughing, or sneezing into hands and then touch other people's hands or common objects

HAND HYGIENE WITH SANITIZERS

- Alcohol-based hand sanitizer:
  - Not to be used when hands are visibly soiled
- Use an alcohol-based hand sanitizer with at least 60% ethanol or 70% isopropanol as active ingredients
- Amount should cover the entire surface of your hands
- Rub hands together until dry

HAND HYGIENE WITH SOAP & WATER

- CLICK THE VIDEO: WHO HAND WASHING TECHNIQUE

https://youtu.be/yhDB0aXzDVQ

Handwashing using water and soap should take around 40-60 seconds.

1.Once your hands are wet, apply soap to cover all of your hands' surfaces.
2. Rub hands palm to palm.
3. Rub your right palm up and down the back of the other with interlaced fingers, and vice versa.
4. Rub palm to palm with your fingers interlaced.
5. Rub the backs of your fingers to opposing palms with fingers bent and interlocked.
6. Rub your left thumb clasped in your right palm, and vice versa.
7. Rub your clasped fingers in a backwards, forwards and rotational direction in the other hand.
8. Rinse hands thoroughly with water.
9. Dry hands thoroughly with a single use towel.
10. Use the towel to turn off the faucet.

Once dry, your hands are clean.

WHEN TO SANITIZE OR WASH HANDS

- **Before, during,** and **after** preparing food
- **Before** and **after** eating food
- **Before** and **after** caring for someone who is sick
- **Before** and **after** treating a cut or wound
- **Before** dispensing medications to clients
- **Before** any direct interactions with a client/patient
- **After** using the toilet
- **After** blowing your nose, coughing, or sneezing
- **After** touching an animal, animal feed, or animal waste
- **After** touching garbage

ENVIRONMENTAL CONTAMINATION

- ORGANISMS ARE EVERYWHERE ESPECIALLY ON ‘HIGH TOUCH’ SURFACES OR SURFACES NOT ROUTINELY CLEANED

ENVIRONMENTAL CONTAMINATION

- DRY SWEEPING USED OFTEN IN NEPAL (INCLUDING IN PHARMACIES) CAN RE-AEROSOLIZE INFECTIOUS PARTICLES, SO CONSIDER USING OTHER CLEANING TECHNIQUES, SUCH AS:
  - CLEAN HIGH-TOUCH SURFACES AT LEAST ONCE A DAY OR AS OFTEN AS DETERMINED IS NECESSARY. EXAMPLES OF HIGH-TOUCH SURFACES INCLUDE: PENS, COUNTERS, TABLES, DOORKNOBS, LIGHT SWITCHES, HANDLES, STAIR RAILS, DESKS, KEYBOARDS, PHONES, TOILETS, FAUCETS, AND SINKS.
  - WASH HANDS WITH SOAP AND WATER FOR 20 SECONDS AFTER CLEANING
  - BLEACH PRODUCTS CAN BE USED FOR DISINFECTING SURFACES.
  - IF THERE HAS BEEN A SICK PERSON IN YOUR FACILITY WITHIN THE LAST 24 HOURS, YOU SHOULD CLEAN AND DISINFECT THE SPACES THEY OCCUPIED.

U.S. Centers for Disease Control and Prevention. Cleaning and Disinfecting Your Facility. Available at: https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html#anchor_1617548446719

ENVIRONMENTAL CONTAMINATION

- MAINTAINING A CLEAN ENVIRONMENT IN PHARMACIES AND OTHER PUBLIC SPACES IS ESSENTIAL TO DECREASING RISK OF SPREAD OF PATHOGENS (INCLUDING COVID 19);
- REDUCING THE SPREAD OF PATHOGENS CAN ALSO HELP TO REDUCE AMR IN THE FUTURE.

U.S. Centers for Disease Control and Prevention. Cleaning and Disinfecting Your Facility. Available at: https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html#anchor_1617548446719

DISCUSSION QUESTIONS

- WHEN SHOULD ALCOHOL BASED HAND SANITIZERS NOT BE USED?
- WHAT ARE SOME HIGH-TOUCH SURFACES IN COMMUNITY PHARMACISTS WHICH CAN CONTRIBUTE TO THE SPREAD OF DISEASE?
- HOW CAN COMMUNITY PHARMACISTS CONTRIBUTE TO INFECTION PREVENTION AND CONTROL WITHIN THEIR SHOPS AND WITHIN THEIR COMMUNITIES?

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

MODULE 8: COMMUNITY EDUCATION AND OUTREACH

MODULE 8 OBJECTIVES

- INCREASE UNDERSTANDING OF THE IMPORTANCE OF PEER-TO-PEER SUPPORT TO DECREASE AMR AND INCREASE IPC;
- TO INCREASE KNOWLEDGE ABOUT HOW TO TALK TO CLIENTS ABOUT ANTIBIOTICS AND AMR;
- INCREASE UNDERSTANDING OF THE ROLE OF PHARMACISTS IN ADVOCATING STEWARDSHIP AND INFECTION PREVENTION AND CONTROL.

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP: COMMUNITY EDUCATION & OUTREACH

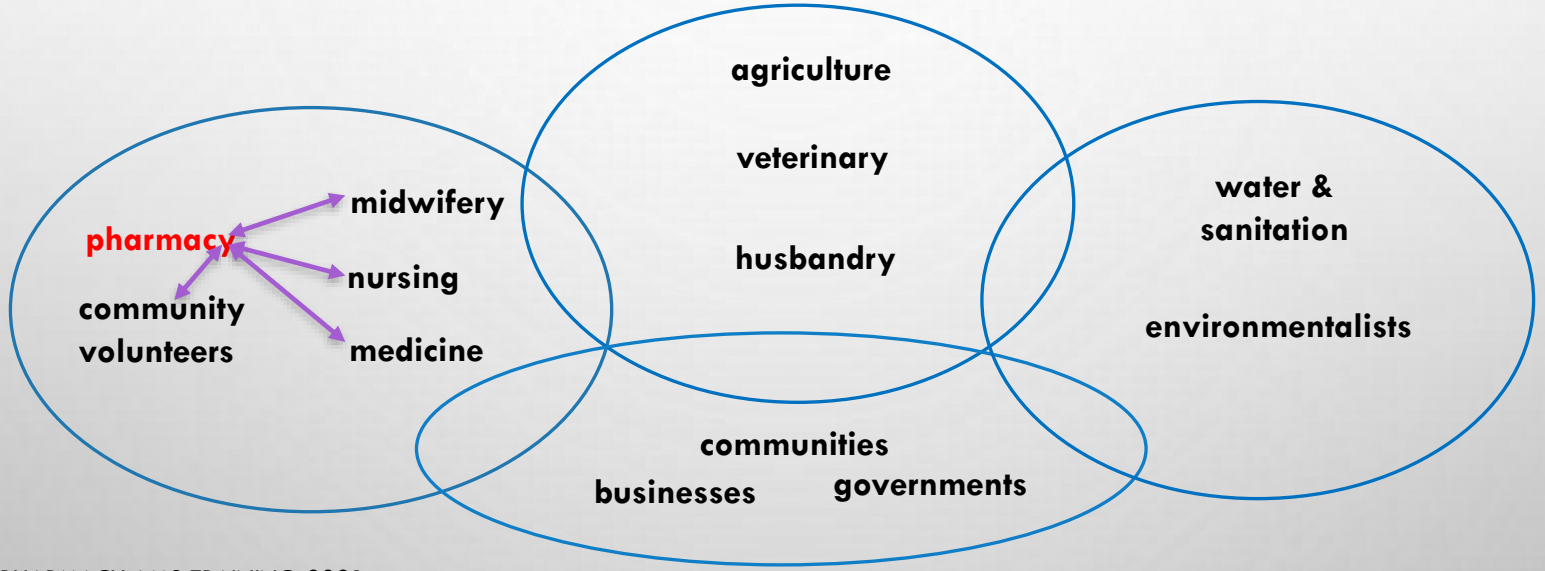
COMMUNITY PHARMACISTS HAVE REGULAR CONTACT WITH THEIR CLIENTS. THIS CAN PROVIDE AN OPPORTUNITY TO INFORM THE GENERAL PUBLIC ABOUT RISKS ASSOCIATED WITH AMR AND WAYS TO DECREASE RISKS WITHIN COMMUNITIES.

AS A HEALTH CARE PROVIDER

- UNDERSTAND THE IMPORTANCE OF **LEARNING AND DEVELOPMENT** AS PART OF PERSONAL AND TEAM DEVELOPMENT.
- BELIEVE THAT EVERY INDIVIDUAL HAS THE CAPACITY TO LEAD BY EXAMPLE WITHIN THEIR PEER GROUP.
  - BE A ROLE MODEL FOR STUDENTS, COLLEAGUES AND PEERS.
  - BE AWARE OF ONE'S OWN AND OTHERS' LIMITATION AND ENCOURAGE WILLINGNESS TO ASK FOR ADVICE. SHOW ENTHUSIASM FOR LEARNING AND FOR TRAINING OTHERS.
  - PROVIDE INFORMATION TO PATIENTS TO SUPPORT STEWARDSHIP.

World Health Organization. 2019. HEALTH WORKERS' EDUCATION AND TRAINING ON ANTIMICROBIAL RESISTANCE. Geneva.

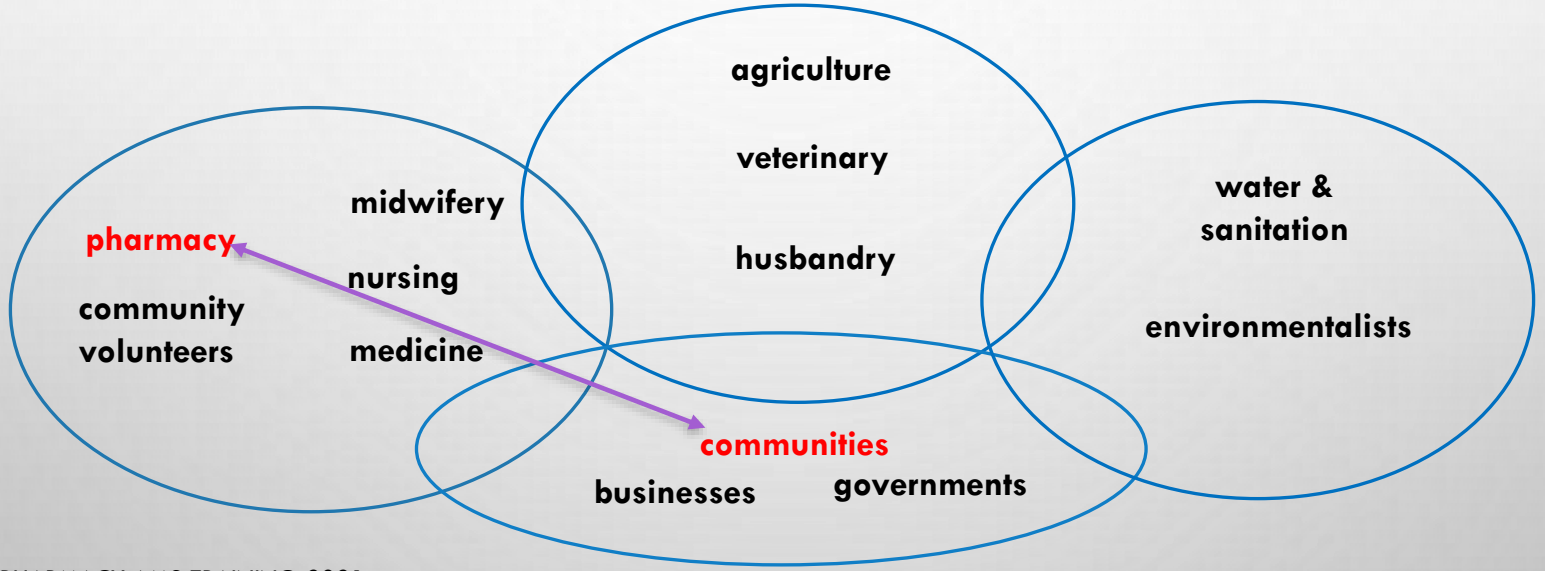
PEER-TO-PEER OUTREACH AND COMMUNICATION



IN-SERVICE TRAININGS AND EDUCATION

- STAFF TRAINING IN AMR, STEWARDSHIP AND IPC
  - PROVIDE WRITTEN INFORMATION OR LINKS TO ON-LINE RESOURCES;
  - BY EXAMPLE – MANAGERS AND STAFF SHOULD SET AN EXAMPLE FOR ONE ANOTHER;
  - DURING CONSULTATION – SHARING EXPERIENCES IN RELATION TO DECISION-MAKING ABOUT DISPENSING OTCS, ANTIBIOTICS;
  - READILY AVAILABLE GUIDELINES, E.G., POSTERS, PAMPHLETS;

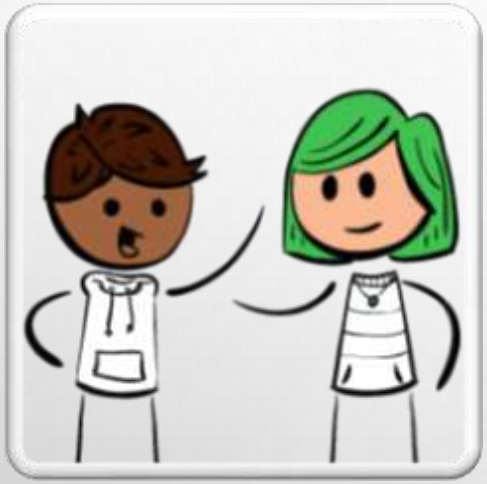
COMMUNITY OUTREACH AND EDUCATION



COMMUNITY OUTREACH AND EDUCATION

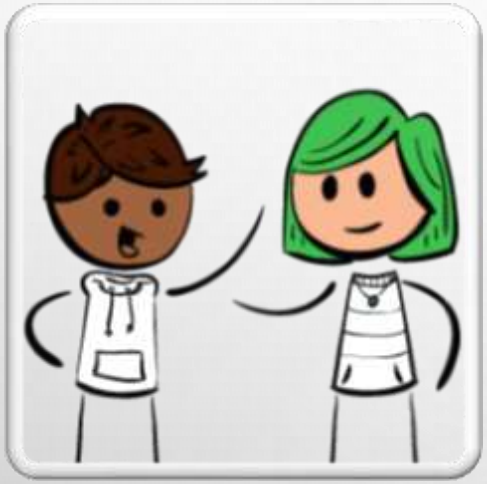
- THERE ARE MANY WAYS YOU CAN COMMUNICATE WITH YOUR CLIENTS AND YOUR COMMUNITY ABOUT ANTIBIOTICS
  - WHEN SOMEONE HAS A PRESCRIPTION FOR ANTIBIOTICS MAKE SURE THEY UNDERSTAND THE NEED TO TAKE THE MEDICATION AS PRESCRIBED, ARE AWARE OF SIDE EFFECT/ALLERGIC REACTIONS, AND ANY INFORMATION REGARDING RESTRICTIONS ON FOODS, ETC., WHILE TAKING THE MEDICATION.
  - DISPLAY POSTERS ABOUT ANTIBIOTIC RESISTANCE AND STEWARDSHIP WITHIN YOUR SHOP.
  - USE THE PREVIOUSLY SUGGESTED STRATEGIES TO TALK TO CLIENTS WHO REQUEST ANTIBIOTICS WITHOUT A PRESCRIPTION.
  - HAVE AVAILABLE BRIEF WRITTEN/ILLUSTRATED INFORMATION ABOUT ANTIBIOTIC USE AND RESISTANCE FOR CLIENTS WHO REQUEST ANTIBIOTICS WITHOUT PRESCRIPTION.
  - PARTICIPATE IN ANTIMICROBIAL RESISTANCE AND STEWARDSHIP AWARENESS WEEK.

COMMUNITY OUTREACH AND EDUCATION



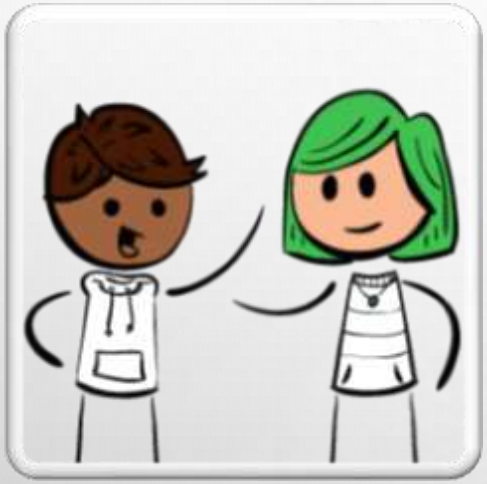
- MESSAGES FOR CONSUMERS
  - **ANTIBIOTICS CAN SAVE LIVES.** WHEN A PATIENT NEEDS ANTIBIOTICS, THE BENEFITS OUTWEIGH THE RISKS OF SIDE EFFECTS AND ANTIBIOTIC RESISTANCE.
  - **ANTIBIOTICS AREN'T ALWAYS THE ANSWER.** EVERYONE CAN HELP IMPROVE ANTIBIOTIC PRESCRIBING AND USE. THE WAY WE TAKE ANTIBIOTICS, HELPS KEEP US HEALTHY NOW, HELPS FIGHT ANTIBIOTIC RESISTANCE, AND ENSURES THAT THESE LIFE-SAVING ANTIBIOTICS WILL BE AVAILABLE FOR FUTURE GENERATIONS.
  - **ANTIBIOTICS DO NOT WORK ON VIRUSES**, SUCH AS THOSE THAT CAUSE COLDS, FLU, BRONCHITIS, OR RUNNY NOSES.

COMMUNITY OUTREACH AND EDUCATION



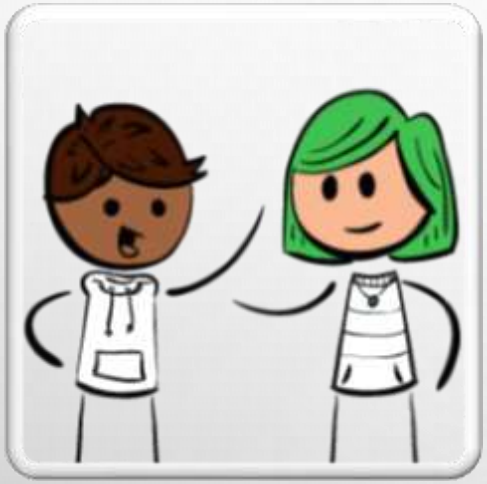
- MESSAGES FOR CONSUMERS
  - **ANTIBIOTICS ARE ONLY NEEDED FOR TREATING CERTAIN INFECTIONS CAUSED BY BACTERIA, BUT EVEN SOME BACTERIAL INFECTIONS GET BETTER WITHOUT ANTIBIOTICS.** ANTIBIOTICS AREN'T NEEDED FOR MANY SINUS INFECTIONS AND SOME EAR INFECTIONS. ANTIFUNGAL DRUGS TREAT FUNGAL INFECTIONS.
  - **AN ANTIBIOTIC WILL NOT MAKE YOU FEEL BETTER IF YOU HAVE A VIRUS.** RESPIRATORY VIRUSES USUALLY GO AWAY IN A WEEK OR TWO WITHOUT TREATMENT. ASK YOUR HEALTHCARE PROFESSIONAL ABOUT THE BEST WAY TO FEEL BETTER WHILE YOUR BODY FIGHTS OFF THE VIRUS.

COMMUNITY OUTREACH AND EDUCATION



- MESSAGES FOR CONSUMERS
  - **WHEN ANTIBIOTICS AREN'T NEEDED, THEY WON'T HELP YOU, AND THE SIDE EFFECTS COULD STILL CAUSE HARM.** SIDE EFFECTS RANGE FROM MINOR TO VERY SEVERE HEALTH PROBLEMS.
  - **TAKING ANTIBIOTICS CAN CONTRIBUTE TO THE DEVELOPMENT OF ANTIBIOTIC RESISTANCE.** ANTIBIOTIC RESISTANCE OCCURS WHEN GERMS LIKE BACTERIA AND FUNGI DEVELOP THE ABILITY TO DEFEAT THE DRUGS DESIGNED TO KILL THEM. IF ANTIBIOTICS LOSE THEIR EFFECTIVENESS, THEN WE LOSE THE ABILITY TO TREAT INFECTIONS.
  - **IF YOU NEED ANTIBIOTICS, TAKE THEM EXACTLY AS PRESCRIBED.** TALK WITH YOUR HEALTHCARE PROFESSIONAL IF YOU HAVE ANY QUESTIONS ABOUT YOUR ANTIBIOTICS.

COMMUNITY OUTREACH AND EDUCATION



- MESSAGES FOR CONSUMERS
  - **DO YOUR BEST TO STAY HEALTHY AND KEEP OTHERS HEALTHY** BY CLEANING HANDS BY WASHING WITH SOAP AND WATER FOR AT LEAST 20 SECONDS OR USING A HAND SANITIZER THAT CONTAINS AT LEAST 60% ALCOHOL; COVERING YOUR MOUTH AND NOSE WITH A TISSUE WHEN YOU COUGH OR SNEEZE; STAYING HOME WHEN SICK; AND GETTING RECOMMENDED VACCINES, SUCH AS THE FLU VACCINE

DISCUSSION QUESTIONS

- WHAT ARE SOME OPPORTUNITIES FOR PHARMACISTS TO EDUCATE CLIENTS AND THEIR COMMUNITIES ABOUT AMR AND STEWARDSHIP?
- WHAT ARE IMPORTANT MESSAGES TO PROVIDE TO CLIENTS AND THE COMMUNITY ABOUT ANTIBIOTICS, ANTIBIOTIC USE, AND INFECTION PREVENTION AND CONTROL?

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

MODULE 9: PROGRAM SUMMARY AND OVERVIEW

KEY MESSAGES

- **PHARMACIES PROVIDE MUCH NEEDED SERVICES TO IMPROVE THE HEALTH OF COMMUNITIES THROUGHOUT NEPAL. THEREFORE, THEY ARE WELL-PLACED TO SUPPORT STEWARDSHIP WITHIN THEIR PHARMACY AND IN THEIR COMMUNITIES**
- **ANTIBIOTICS ARE CLASS "B" DRUGS AND THEREFORE CAN ONLY BE PRESCRIBED BY PHYSICIANS AND SHOULD ONLY BE DISPENSED WITH A PHYSICIAN'S PRESCRIPTION**
- **ANTIMICROBIAL RESISTANCE IS THE ABILITY OF A MICROORGANISM (BACTERIA, VIRUSES, AND SOME PARASITES) TO STOP AN ANTIMICROBIAL (ANTIBIOTICS, ANTIVIRALS AND ANTIMALARIALS) FROM WORKING AGAINST IT. AS A RESULT, STANDARD TREATMENTS BECOME INEFFECTIVE, INFECTIONS PERSIST AND MAY SPREAD TO OTHERS**

KEY MESSAGES

- **MULTIDRUG RESISTANCE IS A CONDITION ENABLING A DISEASE CAUSING ORGANISM TO RESIST DISTINCT DRUG AND CHEMICALS OF A WIDE VARIETY OF STRUCTURE AND FUNCTION TARGETED TO ERADICATE THE ORGANISM**
- **RESISTANCE CAN BE ACQUIRED WHEN ONE TYPE OF BACTERIA PASSES DNA TO ANOTHER TYPE OF BACTERIA**
- **ANTIMICROBIAL RESISTANCE IS A SIGNIFICANT GLOBAL HEALTH PROBLEM**
- **ANTIMICROBIAL RESISTANCE STEWARDSHIP IS EVERYONE'S RESPONSIBILITY**
- **THERE ARE SERIOUS CONSEQUENCES RELATED TO ANTIMICROBIAL RESISTANCE**
  - **SERIOUS COMPLICATIONS INCLUDING DEATH FOR ELDERLY AND CHILDREN**
  - **INCREASED LENGTH OF THERAPY AND MORE DOCTOR VISITS**
  - **PROLONGED HOSPITAL STAY AND SIGNIFICANT INCREASE OF TREATMENT COST**

KEY MESSAGES

- **ANTIBIOTICS SHOULD NEVER BE USED FOR VIRAL INFECTIONS**
  - **COLDS**
  - **INFLUENZA**
  - **COVID-19**
- **WHEN ANTIBIOTICS MIGHT BE NECESSARY TO TREAT SOMEONE, THEY SHOULD BE REFERRED TO A LOCAL CLINIC / OUTPATIENT CENTER AND NOT GIVEN AT THE PHARMACY**
- **ANTIBIOTICS CAN CAUSE ADVERSE EVENTS AND ALLERGIES IN CHILDREN AND ADULTS**
- **OPTIMIZING ANTIBIOTIC USE INCLUDES:**
  - **ONLY USE WHEN NEEDED**
  - **USE THE RIGHT AGENT (ANTIBIOTIC)**
  - **AT THE RIGHT DOSE**
  - **FOR THE RIGHT DURATION**

KEY MESSAGES

- **INFECTION PREVENTION AND CONTROL IS AN ESSENTIAL PART OF ANTIMICROBIAL STEWARDSHIP**
- **HAND WASHING AND USE OF ALCOHOL BASED CLEANERS ARE KEY ELEMENTS TO INFECTION PREVENTION AND CONTROL AND ARE SIMPLE WAYS TO HELP FIGHT ANTIMICROBIAL RESISTANCE**
- **BACTERIA CAN LIVE FOR A LONG PERIOD OF TIME ON SURFACES. IT IS THEREFORE IMPORTANT TO KEEP SURFACES CLEAN. BLEACH PRODUCTS CAN BE USED FOR DISINFECTING SURFACES.**

KEY MESSAGES

- **COMMUNITY PHARMACISTS CAN BE ADVOCATES FOR SUPPORTING STEWARDSHIP IN THEIR PLACES OF WORK AND THEIR COMMUNITIES**

- **EVERYONE HAS A PART TO PLAY IN THIS FIGHT.**

धन्यवाद


danke
謝謝
ngiyabonga
teşekkür ederim
спасибо
dank je
thank you
gracias
tapadh leat
bedankt
hvala
mauruuru
dziękuję
mochchakkeram
go raibh maith agat
obrigado
sagolun
sukriya
kop khun krap
arigatō
takk
dakujem
grazie
мерси
terima kasih
감사합니다
merci
ευχαριστώ

ANTIMICROBIAL RESISTANCE AND STEWARDSHIP

MODULE 10: RESOURCES

AMR RESOURCES

- REACT. POSTER/BOOKLIT FORMAT INFORMATION FOR CONSUMERS (ENGLISH).

HTTPS://WWW.REACTGROUP.ORG/WP-CONTENT/UPLOADS/2016/09/FACTSHEETINDIVIDUAL.JAN2016.PDF

HTTPS://WWW.REACTGROUP.ORG/WP-CONTENT/UPLOADS/2017/04/EPN-SCHOLARY-BOOKLET-COMMUNITIES.PDF

OVERVIEW OF AMR AND STEWARDSHIP VIDEO (NEPALI)

HTTPS://WWW.YOUTUBE.COM/WATCH?V=R6_2LPWXVTU

STEWARDSHIP AND GUIDELINE RESOURCES

- GARP, NEPAL. SITUATIONAL ANALYSIS AND RECOMMENDATIONS FOR ANTIMICROBIAL RESISTANCE IN NEPAL. HTTPS://CDDEP.ORG/WP-CONTENT/UPLOADS/2017/08/GARP-NEPAL_ES.PDF

IPC RESOURCES

- WORLD HEALTH ORGANIZATION TRAINING COURSE ON INFECTION PREVENTION AND CONTROL (ENGLISH)

HTTPS://OPENWHO.ORG/COURSES/IPC-CC-MMIS-EN

- HAND WASHING TECHNIQUE (NEPALI)

HTTPS://WWW.YOUTUBE.COM/WATCH?V=EIIQDFUG3PA

- NEPAL MINISTRY OF HEALTH AND POPULATION. HAND WASHING POSTERS/BROCHURES (NEPALI)

HTTPS://WWW.MOHP.GOV.NP/ENG/MEDIA-DOCS/BROCHURE/HANDWASHING