Antibiotic usage and antimicrobial resistance in tertiary care hospitals of Bangladesh

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AMERICAN SOCIETY FOR MICROBIOLOGY

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- Advance the Microbial Sciences
- Support Microbiology Professionals
- Improve Global Health
- Connect Science, Our Members and the Public

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ADVOCATING FOR SCIENTIFIC RESEARCH

PUBLISHING HIGHLY-CITED PUBLICATIONS

DEPLOYING OUR RESOURCES AND EXPERTISE AROUND THE WORLD

FOSTERING A DEEPER PUBLIC UNDERSTANDING OF MICROBIOLOGY

Introduction

- The World Medicines Situation Report of 2011 concludes that inappropriate antibiotic use, including overuse and misuse, is a serious global problem.
- Inappropriate use of antimicrobials and lack of AMR surveillance are two core contributors to the spread of AMR.
- Studies have revealed that 20–50% of antibiotic utilization is not rational
- Due to lack of antibiotic policy, standard treatment guideline and antimicrobial stewardship program, ensuring rational use of antibiotic by the prescribers in hospitals is a great challenge in Bangladesh

Introduction

- It is further aggravated in COVID-19 pandemic situation.
- This study will give an overall understanding of antibiotic usage and give an opportunity to compare between and within hospitals.
- Besides, information on patterns of antibiotic use in COVID-19 patients will add to the knowledge in the current pandemic
- This study may act as a piloting of more extensive AMR surveillance project continuing in the country

Title:
Antibiotic usage and antimicrobial resistance in tertiary care hospitals of Bangladesh

Type of Study:
Hospital-based cross-sectional study

Conducted by:
Institute of Epidemiology, Disease Control and Research (IEDCR)

Supported by:
American Society for Microbiology (ASM)

Duration:
3 months (from 1 May 2021 to 30 July 2021)

Objectives

General Objective

To find out the antibiotic usage pattern and antibiotic resistance in selected tertiary care hospitals of Bangladesh

Specific Objectives

- To determine the antibiotic usage in inpatient departments (IPD) and intensive care units (ICU) of selected public and private tertiary care hospitals in Bangladesh.

- To estimate the proportions of antibiotics used in patients of IPD and ICU of selected public and private tertiary care hospitals in Bangladesh.

- To estimate the proportions of antibiotics used in COVID-19 patients of IPD and ICU of selected public and private tertiary care hospitals in Bangladesh.

Specific Objectives

- To describe the antibiotic usage in COVID-19 patients IPD and ICU of selected public and private tertiary care hospitals in Bangladesh.
- To compare the antibiotic usage pattern of IPD and ICU of public and private tertiary care hospitals in Bangladesh.
- To compare the antibiotic usage patterns of public and private tertiary care hospitals against WHO prescribing indicators of antibiotics.
- To describe the antimicrobial sensitivity (AST) patterns of selected public and private tertiary care hospitals in that time period.

Sentinel sites:

Division	Hospital
Dhaka	1. Sir Salimullah Medical College Mitford hospital (SSMC- MH) 2. Uttara Adhunik Medical College Hospital (UAMCH)
Chattogram	1. Chattogram Medical College Hospital (CMCH) 2. Chattogram International Medical College (CIMCH) 3. Bangladesh Institute of Tropical and Infectious Diseases (BITID)
Rajshahi	1. Rajshahi Medical College Hospital (RMCH) 2. Islami Bank Medical College Hospital (IBMCH)
Sylhet	1. Sylhet MAG Osmani Medical College hospital (SOMCH) 2. Jalalabad Ragib Rabeya Medical College Hospital (JRRMCH) 3. Shaheed Shamsuddin Ahmed Hospital, Sylhet (SSAMCH)

Data Analysis Strategy

- Proportions of antibiotics used (single, double or multiple) in every patient was calculated, according to the hospital type (whether public or private), and according to patient settings (whether IPD or ICU or COVID-19 unit)

- Additionally, antibiotics was categorized according to the World Health Organization (WHO) AWaRe classification framework.

- Susceptibility pattern microorganisms isolated from the specimens in microbiology laboratory was collected and analyzed.

Expected Outcomes of the Study

- This study will act as a pilot project for the understanding of antimicrobial uses patterns in IPDs, ICUs, COVID-19 patients, public and private tertiary care hospitals throughout the country.

- The result may guide for the impending necessity of an Antimicrobial uses in the country and also for the antibiotic stewardship program.


Orientation on
"Antibiotic usage and antimicrobial resistance in tertiary care hospitals of Bangladesh"
Venue: Jalalabad Ragib-Rabeya Medical College & Hospital, Sylhet
Date:19th May 2021
Institute of Epidemiology, Disease Control and Research (IEDCR)
Mohakhali Dhaka-1212
American Society for Microbiology (ASM)
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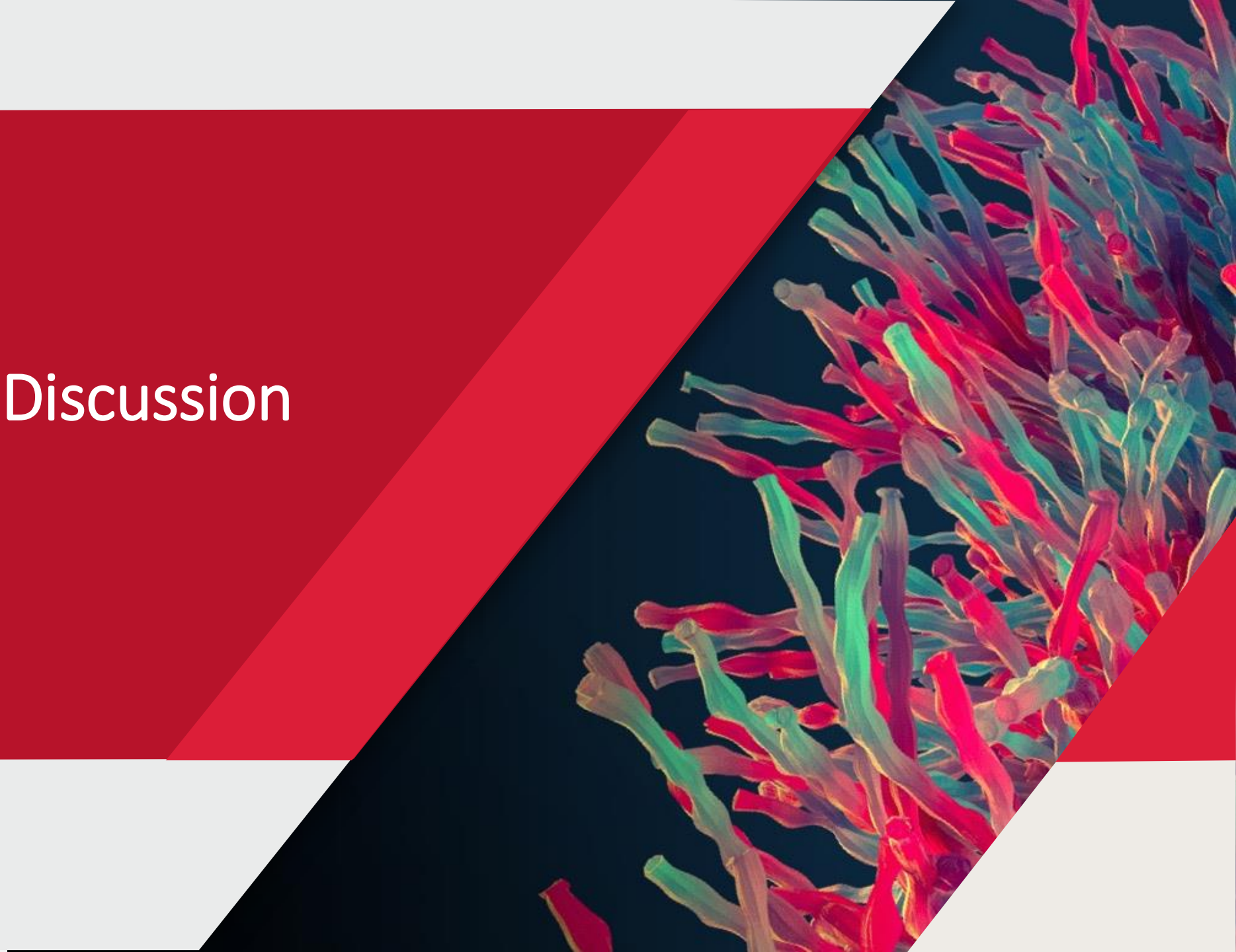
সিলেট এম এ জি ওসমানী মেডিকেল কলেজ, সিলেট
সেবা পেতে মাস্ক পরুন
সঠিক
সঠিক নয়
No Mask
No Service
মুজিব শতবর্ষ
সোনালী ব্যাংক লিমিটেড

Definition and Discussion



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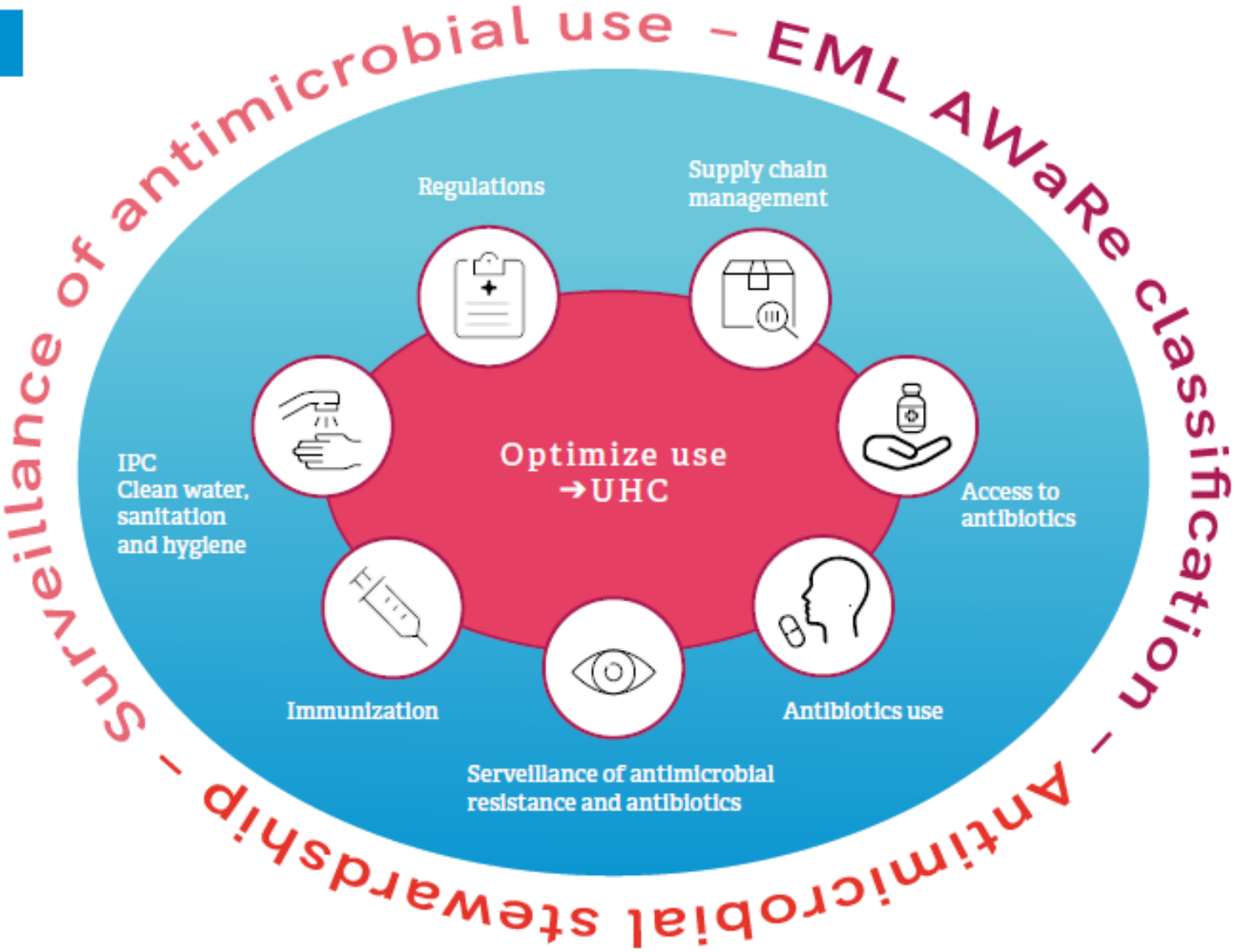
Antimicrobial Stewardship Programme

Stewardship is defined as “the careful and responsible management of something entrusted to one’s care”. It was originally applied in the health-care setting as a tool for optimizing antimicrobial use, termed “antimicrobial stewardship” (AMS)

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

AMS principles also apply to the use of antimicrobials in the animal and agriculture sectors, typically with an emphasis on the responsible and prudent use of these agents.



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- **Access group:**

This group includes antibiotics that have activity against a wide range of commonly encountered susceptible pathogens while also showing lower resistance potential than antibiotics in the other groups. Selected Access group antibiotics are recommended as essential first or second choice empiric treatment options.

- **Watch group:**

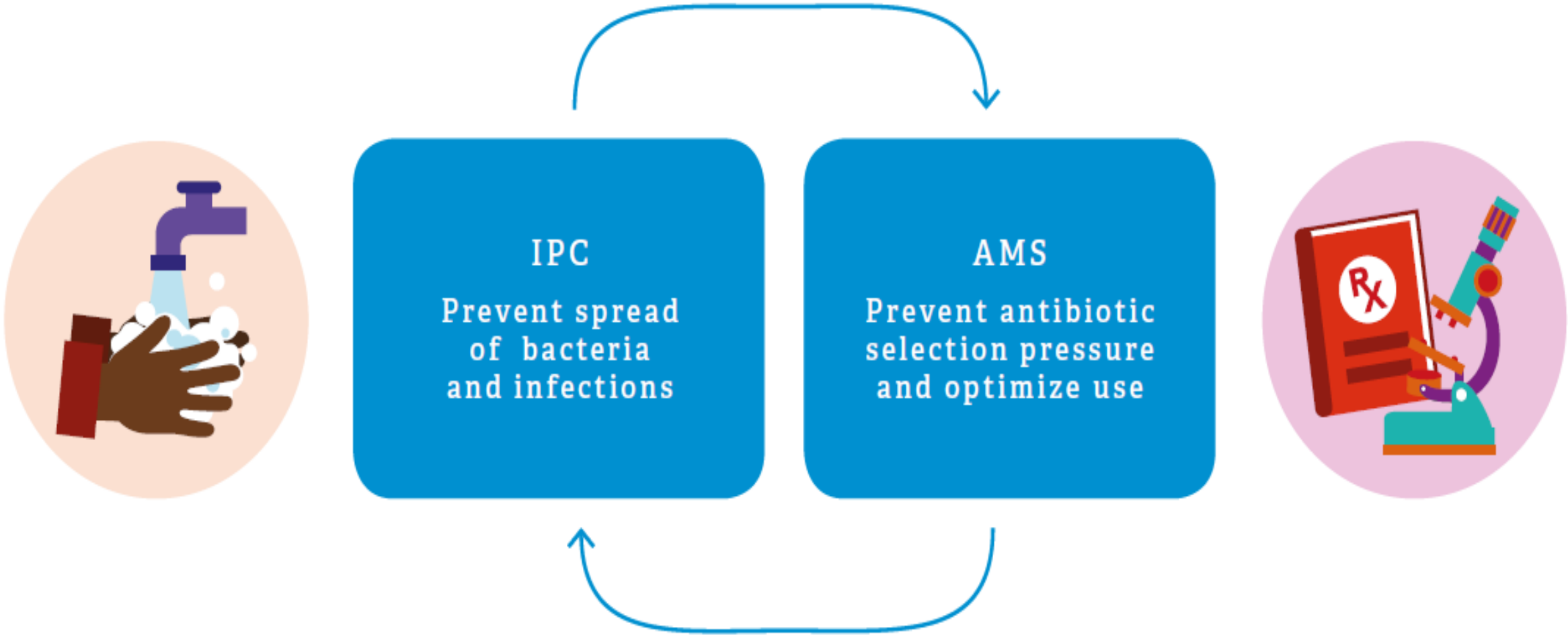
This group includes antibiotic classes that have **higher resistance potential** and includes most of the highest priority agents among the **Critically Important Antimicrobials** for Human Medicine and/or antibiotics that are at relatively high risk of selection of bacterial resistance.

- **Reserve group:**

This group includes antibiotics and antibiotic classes that should be reserved for treatment of confirmed or suspected infections due to multi-drug-resistant organisms. Reserve group antibiotics should be treated as “last resort” options.

WHO Essential Medicines List

Links between IPC and AMS in delivering quality health care and optimizing antibiotic use



Contextual Information For Data Interpretation

Contextual data may comprise information on:

-hospital characteristics;

-hospital structure;

-coverage of the consumption data;

-supply coverage of the pharmacy;

-data sources and type of hospital activity indicator(s); and

-implementation of antimicrobial stewardship activities.

Antimicrobial Use Indicators

Hospital Indicators

Prescribing Indicators

Patient Care Indicators Indicator

Supplemental Indicator

Strategic Objectives Of National Action Plan (NAP)

1. Establish multi-sectoral approach
2. **Ensure Rational Use of Antimicrobial agents (AMs)**
3. Promote and strengthen infection prevention and control (IPC) measures in both human and animal health sectors.
4. **Surveillance**
5. Promote basic, experimental and operational research in the area of AMR
6. Establish advocacy, communication and social mobilization (ACSM)


Result

Socio-demographic Characteristics

Gender Distribution

Sex	Medicine	Surgery	Gynaecology	COVID	ICU	Total
	n(%)	n(%)	n(%)	n(%)	n(%)	
Male	1087(54.46)	645(65.55)	-	436(50.11)	171(57.19)	2,339
Female	909(45.54)	339(34.45)	1160(100)	434(49.89)	128(42.81)	2,969
Total	1996	984	1160	870	299	5,309

Age Distribution

Age group (Years)	Medicine	Surgery	Gynaecology	COVID	ICU	Total
	n(%)	n(%)	n(%)	n(%)	n(%)	
≤20	164(8.22)	131(13.31)	282(24.31)	14(1.61)	29(9.7)	620
21-40	757(37.92)	466(47.36)	830(71.55)	220(25.29)	89(29.77)	2350
41-60	683(34.22)	283(28.76)	45(3.88)	365(41.95)	88(29.43)	1453
Above 60	392(19.64)	104(10.57)	3(0.26)	271(31.15)	93(31.1)	863
Total	1996	984	1160	870	299	5309

General Information of the Participating Hospitals

	SsMCH	UAMCH
Division	Dhaka	
Category	Public	Private
Total Number of Bed	900	348 (Approved 500)
Presence of ICU	Yes	Yes
Total Bed in ICU	8	17
ICU (COVID/Non-COVID)	Non-COVID	Non-COVID
COVID Bed Number	N/A	35
Medicine Bed Number	195	109
Surgery Bed Number	140	54
Gynecology Bed Number	119	31
High Risk wards	Hematology Burn	COVID
Rehabilitation ward	No	No

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General Information of the Participating Hospitals

	CMCH	CIMCH	BITID
Division	Chattagram		
Category	Public	Private	Public
Total Number of Bed	1300	300	120
Presence of ICU	Yes	No	Yes (Recently started in July)
Total Bed in ICU	30	N/A	5
ICU (COVID/Non-COVID)	Mixed	N/A	COVID
COVID Bed Number	290	90	45
Medicine Bed Number	170	33	70
Surgery Bed Number	158	45	N/A
Gynecology Bed Number	160	90	N/A
High Risk wards	Hematology, Oncology, Burns	No	Infectious disease
Rehabilitation ward	No	No	No

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Department Wise Top Ten Used Antibiotic

	COVID Ward (N=1168)		ICU(N=321)		COVID ICU(N=157)	
Sl. no	Name of antibiotic	(%)	Name of antibiotic	(%)	Name of antibiotic	(%)
1	Ceftriaxone	47	Meropenem	30	Meropenem	70
2	Meropenem	17	Ceftriaxone	25	Tigecycline	10
3	Amoxicilin + CA	12	Metronidazole	17	Ceftriaxone	6
4	Moxifloxacin	9	Linezolid	4	Piperacillin+Tazobactum	6
5	Ramdisivir	4	Amikacin	3	Moxifloxacin	6
6	Clarithromycin	2	Moxifloxacin	3	Clarithromycin	11
7	Ciprofloxacin	1	Cefuroxime	2	Doripenem	11
8	Cefixime	1	Flucloxacillin	2		
9	Piperacillin+Tazobactum	1	Acyclovir	1		
10	Metronidazole	1	Vancomycin	1		

Ten most frequently used antimicrobial in Public and Private hospital and the most sensitive antibiotics found in laboratory

Sl no	Public hospital(4416)				Private hospital (3242)			
	Antibiotic used	%	Antibiotic sensitivity in culture	%	Antibiotic	%	Antibiotic in culture	%
1	Ceftriaxone	39	24%		Ceftriaxone	33	43%	
2	Metronidazole	18	Not Tested		Metronidazole	14	Not Tested	
3	Ciprofloxacin	10	46%		Cefixime	10	25%	
4	Meropenem	9	57%	180(5.97)	Cefuroxime	7	21%	79(3.44)
5	Amoxicilin + CA	5	11%		Ciprofloxacin	6	48%	
6	Flucloxacillin	3	38%		Flucloxacillin	5	85%	
7	Azithromycin	2	30%		Azithromycin	4	33%	
8	Cefuroxime	2	13%		Meropenem	4	90%	
9	Cefixime	2	6%		Moxifloxacin	4	7%	
10	Amikacin	1	74%		Amoxicilin + CA	2	52%	

Sitewise Most commonly used Antimicrobials In Covid Ward

UAMC(N=219)		CMCH (N=205)		RMCH (N=396)		Shahid Sam Suddin (N=97)		BITID (N=250)	
Antibiotic	%	Antibiotic	%	Antibiotic	%	Antibiotic	%	Antibiotic	%
Moxifloxacin	39.3	Ceftriaxone	30.7	Ceftriaxone	55.8	Ceftriaxone	52.6	Ceftriaxone	62.8
Ceftriaxone	27.9	Clavulanic Acid	28.3	Meropenem	31.1	Ramdisivir	22.7	Amoxicilin + CA	24.8
Meropenem	23.7	Clarithromycin	11.7	Moxifloxacin	4.8	Meropenem	6.2	Ciprofloxacin	4.8
Linezolid	2.3	Ramdisivir	11.7	Amoxicilin + CA	2.8	Cefixime	4.1	Azithromycin	2.0
Piperacillin+TZ	2.3	Meropenem	8.8	Cefixime	1.3	Moxifloxacin	3.1	Cefixime	1.6
Amoxicilin +CA	1.4	Baricitinib	3.9	Piperacillin+TZ	1.3	Clarithromycin	2.1	Meropenem	1.6
Cefuroxime	0.9	Metronidazole	2.0	Azithromycin	0.8	Levofloxacin	2.1	Cefuroxime Axetil	0.4
Ceftibuten	0.5	Amikacin	0.5	Metronidazole	0.8	Amoxicilin +CA	1.0	Clarithromycin	0.4
Clindamycin	0.5	Amoxicillin	0.5	Cefuroxime	0.3	Azithromycin	1.0	Levofloxacin	0.4
Levofloxacin	0.5	Cefuroxime	0.5	Ciprofloxacin	0.3	Flucloxacillin	1.0	Mrtronidazole	0.4

Antibiotic used mostly before Surgical intervention In Public & Private Hospital

Public hospital (n= 212)367			Private hospital (n=212)349		
Name of antibiotic	n	%	Name of antibiotic	n	%
Ceftriaxone	168	45.8	Ceftriaxone	108	30.9
Metronidazole	109	29.7	Metronidazole	98	28.1
Flucloxacillin	35	9.5	Cefuroxime	52	14.9
Amoxicillin+CA	18	4.9	Flucloxacillin	23	6.6
Cefuroxime	16	4.4	Ciprofloxacin	20	5.7

Hospital

Public hospital (n=263)			Private Hospital (n=284)		
	N	%		N	%
Ceftriaxone	244	49.7	Ceftriaxone	264	81.5
Metronidazole	228	46.4	Metronidazole	34	10.5
Ceftazidime	14	2.6	Cefazolin-	7	2.2
Cefradin	4	0.8	Cefixime	5	1.5
Azithromycin	1	0.2	Fucloxacillin	4	1.2
			Cefuroxime	3	0.9

Overall Antibiotic Use of Antimicrobial According To AWaRe Classification

Overall AWaRe classification (n=7658)	%
Access	28.0
Watch	69.4
Reserve	0.8
Not recommanded	0.4
Not included in AWaRe classification	1.4

recommended antimicrobials Used In Different Hospitals

Reserve			Not Recommended (N=26)		
Antibiotic	(n=66)	%	Antibiotic	(n=26)	%
Linezolid	45	68.1	Cefuroxime +Clavulanic Acid	26	100
Tedizolid Phosphete	1	1.5			
Tigecycline	20	30.3			

Antimicrobial Stewardship Indicators

SL. No.		Yes	No	N/A
1	Does the hospital have a Pharmacy and Therapeutics Committee?	5	5	
2	Does the hospital have a person or formal organizational structure responsible for pharmacovigilance?	3	7	
3	Does your facility have a formal antimicrobial stewardship programme accountable for ensuring appropriate antimicrobial use?	2	8	
4	Does your facility have a formal organizational structure responsible for antimicrobial stewardship (e.g., a multidisciplinary committee focused on appropriate antimicrobial use, pharmacy committee, patient safety committee or other relevant structure)?	2		8
5	Is an antimicrobial stewardship team available at your facility (e.g., greater than one staff member supporting clinical decisions to ensure appropriate antimicrobial use)?	2		8
6	Is there a physician identified as a leader for antimicrobial stewardship activities at your facility?	2		8

Antimicrobial Stewardship Indicators

SL. No.		Yes	No	N/A
7	Is there a pharmacist responsible for ensuring appropriate antimicrobial use at your facility?	2		8
8	Does your facility provide any salary support for dedicated time for antimicrobial stewardship activities (e.g., percentage of full-time equivalent [FTE] for ensuring appropriate antimicrobial use)?	2		8
9	Does your facility have the information technology (IT) capability to support the needs of the antimicrobial stewardship activities?	2		8
10	Does your facility have an outpatient parenteral antibiotic therapy (OPAT) unit?	1	3	
11	Does your facility have an infection prevention and control committee?	7	3	
12	Does your facility have a microbiological laboratory/division within the hospital?	9	1	
13	Does your facility have access to microbiological services outside the hospital?	8	2	

Policy and Practice regarding Antimicrobial use

SL. No.		Yes	No	N/A
1	Does your facility have an antibiotic formulary (including restricted and unrestricted antibiotics) that is updated regularly?	2	8	
2	Is the antibiotic formulary based on the Essential Medicines List?			
3	Does your facility have an antibiotic guideline?	4	6	
4	Does your facility have local antibiotic guidelines, adapted to the specific circumstances of the hospital (e.g., with respect to the local resistance rates)?	6	6	

Policy and Practice regarding Antimicrobial use

SL. No.		Yes	No	N/A
5	Does your facility have facility-specific treatment recommendations based on local antimicrobial susceptibility to assist with antimicrobial selection for common clinical conditions?	6	4	
6	Does your facility have a written policy that requires prescribers to document an indication in the medical record or during order entry for all antimicrobial prescriptions?	2	8	
7	Is it routine practice for specified antimicrobial agents to be approved by a physician or pharmacist in your facility (e.g., pre-authorization)?	5	5	
8	Is there a formal procedure for a physician, pharmacist or other staff member to review the appropriateness of an antimicrobial at or after 48 hours from the initial order (post-prescription review)?	5	5	

Monitoring and Feedback

SL. No.		Yes	No	N/A
1	Has your facility produced a cumulative antimicrobial susceptibility report in the past year?	5	4	
2	Does your facility monitor if the indication is captured in the medical record for all antimicrobial prescriptions?	4	6	
3	Does your facility audit or review surgical antimicrobial prophylaxis choice and duration?	4	6	
4	Does your facility monitor antimicrobial use?	1	8	
5	Does your facility monitor antimicrobial use by grams (defined daily dose, DDD) or counts (days of therapy, DOT) by patient by day?	1		8

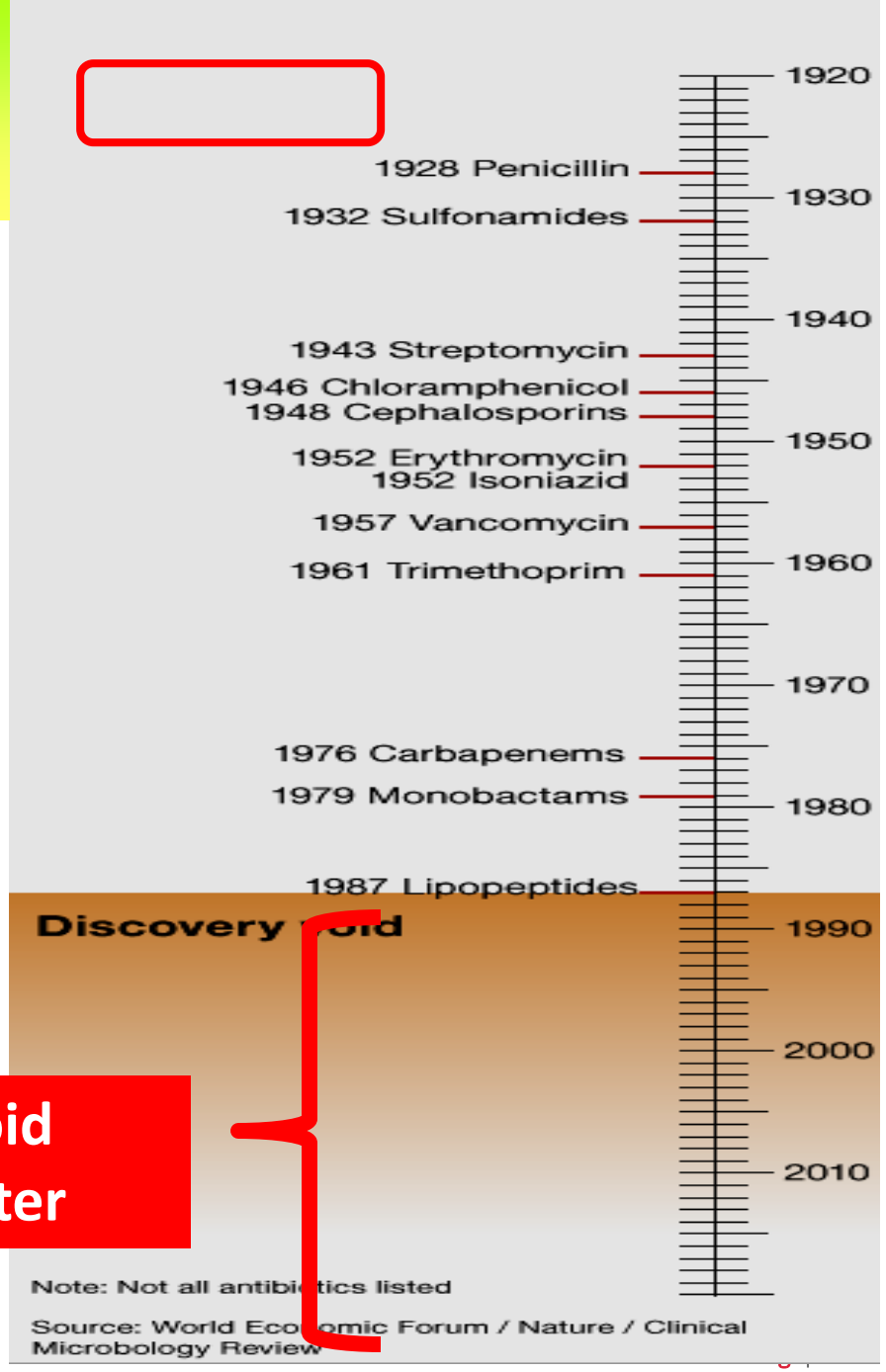
Monitoring and Feedback

SL. No.		Yes	No	N/A
6	Is monitored antimicrobial use reported by hospital activity denominator (e.g., by number of admissions or patient days)?	1		8
7	Are results of antimicrobial audits or reviews communicated directly with prescribers?		1	8
8	Has an annual report that is focused on antimicrobial stewardship (summary antimicrobial use and/or practices improvement initiatives) been produced for your facility in the past year?	2	5	2
9	Is your facility participating in a national antimicrobial resistance surveillance programme?	6	4	
10	Is your facility participating in a national antimicrobial consumption surveillance programme?	3	7	

Take home message

No New antibiotics in the pipe line

Prepare for a pre antibiotic-era



Thank You!

Questions? Contact Us.

Acknowledgement:

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