WEEKLY EPIDEMIOLOGICAL REPORT

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Antimicrobial Resistance

Antimicrobials

An antimicrobial is an agent that kills microorganisms or stops their growth and it is one of the most successful inventions in the history of medicine. After discovery of penicillin in September 3, 1928 by Alexander Fleming; streptomycin, chloramphenicol and tetracycline ushered in the modern antibiotic era. Today, the evolution of antimicrobial resistance by important human pathogens has rendered these original antibiotics, and most of their successors largely ineffective, and if replacements are not found, the golden age of antibiotics will soon come to an end.

What is Antimicrobial Resistance?

Antimicrobial resistance (AMR) is the ability of a microorganism (like bacteria, viruses, and some parasites) to stop an antimicrobial (such as antibiotics, antivirals and antimalarials) from working against it.

Antimicrobial resistance is the broader term for resistance in different types of microorganisms and encompasses resistance to antibacterial, antiviral, antiparasitic and antifungal drugs.

The development of resistance is linked to how often antibiotics are used. The presence of individuals in an environment with continuously under heavy antimicrobial pressure results in the emergence and spread of resistant organisms to other patients in the form of cross-infection (Figure 01).

As many antibiotics belong to the same class of medicines, resistance to one specific antibiotic agent can lead to resistance to a whole related class. Similarly resistance that develops in one organism or location can also spread rapidly and unpredictably, for instance, exchange of genetic material between different bacteria, can affect antimicrobial treatment of a wide range of infections and diseases.

Drug-resistant bacteria can circulate in populations of human beings and animals, through food, water and the environment, and transmission is influenced by trade, travel and both human and animal migration. Resistant bacteria can be found in food animals and food products destined for consumption by humans.

Therefore strategies to prevent the emergence and spread of antimicrobial-resistant organisms are essential.

AMR as a global health risk

Antimicrobial resistance has emerged as a major public health problem all over the world. Infections caused by resistant microbes fail to effective prevention actions and respond to treatment, resulting in prolonged illness and greater risk of death. Treatment failures also lead to longer periods of infectivity, with increased numbers of infected people moving in the community. This in turn exposes the general population to the risk of contracting a resistant strain of microorganisms. When these become resistant to first-line antimicrobials, the prohibitive high cost of the second-line drugs may result in failure to treat these diseases in many individuals. Most alarming of all are the diseases caused by multidrug-resistant microbes, which are virtually non-treatable and thereby create a “post-antibiotic era” scenario.

Further, without effective antimicrobials for prevention and treatment of infections, medical procedures such as organ transplantation, cancer chemotherapy, diabetes management and major surgery become risk.

In addition AMR is a drain on the global economy with economic losses due to reduced productivity caused by sickness and higher costs of treatment. To counter it needs long-term investment, such as financial and technical support for developing coun-

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tries and in development of new medicines, diagnostic tools, vaccines and other interventions, and in strengthening health systems to ensure more appropriate use of and access to antimicrobial agents.

Antimicrobial resistance is placing the gains of the Millennium Development Goals at risk and endangers achievement of Sustainable Development Goals.

Acceleration of the emergence and spread of antimicrobial resistance

Antimicrobial resistance occurs naturally over time, usually through genetic changes. However, the misuse and overuse of antimicrobials is accelerating this process. In many places, antibiotics are overused and misused in people and animals, and often given without professional clinical judgments. Examples of misuse include when they are taken by people with viral infections like colds and flu, and when they are given as growth promoters in animals and fish.

Antimicrobial resistant-microbes are found in people, animals, food, and the environment (in water, soil and air). They can spread between people and animals, and from person to person. Poor infection control, inadequate sanitary conditions and inappropriate food-handling encourage the spread of antimicrobial resistance.

Globally important resistant infections

Resistance in nosocomial infections

The situation on the development of new antimicrobial agents is not very encouraging. Hardly any promising agents are in the pipeline for treatment of some common multidrug-resistant nosocomial organisms commonly grouped under acronym of ESKAPE:

- *Enterococcus faecium* (vancomycin-resistant enterococci-VRE).
- *Staph aureus* (methicillin-resistant Staphylococcus aureus-MRSA).
- *Klebsiella* and *Escherichia coli* that are producing extended spectrum beta-lactamases (ESBL) enzymes and carbapenemases.
- *Acinetobacter baumannii*.
- *Pseudomonas aeruginosa*.
- *Enterobacter sp*.

Resistance in tuberculosis (TB)

WHO estimates that, in 2014, there were about 480 000 new cases of multidrug-resistant tuberculosis (MDR-TB), a form of tuberculosis that is resistant to the 2 most powerful anti-TB drugs. Only about a quarter of these (123 000 cases) were detected and reported. MDR-TB requires treatment courses that are much longer and less effective than those for non-resistant TB. Globally, only half of MDR-TB patients were successfully treated in 2014.

Among new TB cases in 2014, an estimated 3.3% were multidrug-resistant. The proportion is higher among people previously treated for TB, at 20%.

Extensively drug-resistant tuberculosis (XDR-TB), a form of tuberculosis that is resistant to at least 4 of the core anti-TB drugs, has been identified in 105 countries. An estimated 9.7% of people with MDR-TB have XDR-TB.

Resistance in malaria

As of July 2016, resistance to the first-line treatment for *P. falciparum* malaria has been confirmed in 5 countries of the Greater Mekong sub-region (Cambodia, the Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam. Along the Cambodia-Thailand border, *P. falciparum* has become resistant to almost all available antimalarial medicines, making treatment more challenging and requiring close monitoring. The spread of resistant strains to other parts of the world could pose a major public health challenge and jeopardize important recent gains in malaria elimination and control.

Resistance in HIV

In 2010, an estimated 7% of people starting antiretroviral therapy (ART) in developing countries had drug-resistant HIV. In developed countries, the same figure was 10–20%. Some countries have recently reported levels at or above 15% amongst those starting HIV treatment, and up to 40% among people re-starting treatment. Increasing levels of resistance have important economic implications as second and third-line regimens are 3 times and 18 times more expensive, respectively, than first-line drugs.

Resistance in influenza

Antiviral drugs are important for treatment of epidemic and pandemic influenza. So far, virtually all influenza A viruses circulating in humans were resistant to one category of antiviral drugs – M2 Inhibitors (amantadine and rimantadine). However, the frequency of resistance to the neuraminidase inhibitor oseltamivir remains low (1 -2%). Antiviral susceptibility is constantly monitored through the WHO Global Influenza Surveillance and Response System.

Global initiatives to prevent antimicrobial resistance

The WHO has developed a global action plan on antimicrobial resistance with broad multisectoral and Member States' consultations, as requested by the Health Assembly in resolution WHA67.25 in May 2014.

Source: Antimicrobial resistance available at http://www.who.int/mediacentre/factsheets/fs194/en/

Compiled by Dr. K M Senevirathne of Epidemiology Unit.

Table 1: Selected notifiable diseases reported by Medical Officers of Health 29th– 04th August 2017 (31stWeek)

RDHS Division	Dengue Fever		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Chickenpox		Meningi-tis		Leishmani-asis		WRCD	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	T*	C**
Colombo	1713	27560	2	42	0	3	1	22	1	26	0	70	0	2	1	12	0	0	8	241	0	19	0	1	**21**	**100**
Gampaha	1315	25087	0	22	0	12	0	16	0	8	1	36	0	9	2	10	0	1	3	198	0	22	0	2	**6**	**100**
Kalutara	562	7937	0	39	0	3	0	10	0	50	2	190	0	5	1	4	0	0	4	378	2	91	0	1	**1**	**99**
Kandy	687	8995	0	59	0	3	0	4	0	9	0	31	3	98	1	10	0	0	7	169	0	27	0	8	**13**	**100**
Matale	145	2009	0	17	0	1	0	1	0	7	0	29	0	2	0	5	0	0	2	36	4	47	0	5	**12**	**100**
NuwaraEliy	48	654	1	18	1	8	1	24	0	50	2	32	1	136	0	17	0	0	3	252	0	34	0	0	**50**	**100**
Galle	288	4505	1	38	1	8	0	12	1	13	9	212	3	38	0	1	0	1	8	284	0	48	0	0	**16**	**100**
Hambantot	121	2504	0	15	0	6	0	7	0	17	2	38	0	43	0	7	0	1	2	150	0	15	5	198	**9**	**100**
Matara	304	4666	0	25	0	8	0	2	0	5	3	144	1	20	1	6	0	1	6	162	1	5	5	90	**9**	**100**
Jaffna	73	3503	2	183	0	12	2	30	0	51	1	24	1	398	0	3	0	0	2	136	0	30	0	0	**40**	**88**
Kilinochchi	28	380	0	13	0	1	1	10	0	1	0	3	0	12	0	2	0	0	0	3	0	7	0	2	**24**	**100**
Mannar	0	499	0	5	0	0	0	2	0	1	0	2	0	2	0	0	0	0	0	13	0	0	0	0	**15**	**100**
Vavuniya	16	621	0	13	0	0	1	30	0	6	0	24	0	7	0	1	0	0	0	21	0	2	0	9	**12**	**98**
Mullaitivu	10	251	0	8	0	1	0	3	0	1	0	15	0	4	0	1	0	1	1	15	0	5	0	1	**8**	**100**
Batticaloa	42	4341	2	70	0	8	0	13	1	20	2	20	0	0	0	4	0	1	0	131	0	21	0	1	**2**	**100**
Ampara	33	671	0	16	0	2	0	1	0	0	0	11	0	1	0	3	0	0	1	137	0	31	0	3	**31**	**100**
Trincomale	21	4540	1	14	0	2	0	5	0	17	0	17	0	12	0	17	0	0	0	102	0	18	0	4	**18**	**97**
Kurunegala	477	8006	1	50	0	6	0	2	0	16	0	50	0	24	0	16	0	2	5	383	1	46	3	105	**10**	**100**
Puttalam	392	3949	1	30	0	2	0	2	0	0	0	19	0	11	0	1	0	0	1	111	2	37	0	3	**8**	**100**
Anuradhap	112	2209	2	28	0	3	0	1	0	10	1	57	0	13	1	10	0	1	4	294	2	48	5	171	**7**	**100**
Polonnaruw	24	1052	0	12	0	5	0	9	0	5	0	30	0	6	0	6	0	0	0	170	0	12	5	93	**3**	**97**
Badulla	146	2551	1	66	0	5	0	7	0	2	0	67	1	76	0	46	0	1	4	260	4	125	0	12	**7**	**98**
Monaragala	96	1710	1	41	0	3	0	1	0	9	1	93	1	88	1	17	0	1	4	64	1	42	0	13	**26**	**100**
Ratnapura	552	8458	3	104	0	64	0	7	0	8	5	414	0	22	2	58	0	0	1	224	1	127	0	16	**9**	**98**
Kegalle	439	6784	0	27	0	8	0	4	0	17	1	54	0	57	0	11	0	0	1	191	2	48	0	8	**1**	**100**
Kalmune	48	1977	1	59	0	4	0	4	2	278	0	7	0	0	0	2	0	0	1	113	1	14	0	0	**12**	**100**
SRILANKA	**7752**	**133951**	**21**	**1005**	**2**	**179**	**6**	**228**	**5**	**627**	**30**	**1688**	**11**	**1075**	**10**	**270**	**0**	**11**	**68**	**4227**	**2**	**92**	**23**	**746**	**15**	**99**

Source: esurveillance.epid.gov.lk

*T=Timeliness refers to returns received on or before 04thAugust , 2017 Total number of reporting units 344 Number of reporting units data provided for the current week: 342 C**-Completeness

Table 2: Vaccine-Preventable Diseases & AFP

29th– 04th August 2017 (31stWeek)

Disease	No. of Cases by Province									Number of cases during current week in 2017	Number of cases during same week in 2016	Total number of cases to date in 2017	Total number of cases to date in 2016	Difference between the number of cases to date in 2017 & 2016
	W	C	S	N	E	NW	NC	U	Sab					
AFP*	00	01	00	00	00	01	00	00	00	02	02	43	42	2.3%
Diphtheria	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
Mumps	02	01	00	00	00	00	01	00	01	03	06	209	247	- 15.3%
Measles	01	03	00	00	00	00	01	00	01	05	01	150	304	- 50.6%
Rubella	00	00	00	00	00	00	00	00	00	00	00	05	06	- 16.6%
CRS**	00	00	00	00	00	00	00	00	00	00	00	01	00	0%
Tetanus	00	00	00	00	00	00	00	00	00	00	00	11	07	57.1%
Neonatal Tetanus	00	00	00	00	00	00	00	00	00	00	00	00	00	0%
Japanese Encephalitis	00	00	00	00	00	00	00	00	00	00	00	21	12	162.5%
Whooping Cough	00	00	00	00	00	00	00	00	00	00	01	10	36	- 72.2%
Tuberculosis	58	12	02	01	09	31	00	03	17	133	197	5069	5646	-10.2%

Key to Table 1 & 2

Provinces: **W**: Western, **C**: Central, **S**: Southern, **N**: North, **E**: East, **NC**: North Central, **NW**: North Western, **U**: Uva, **Sab**: Sabaragamuwa.

RDHS Divisions: **CB**: Colombo, **GM**: Gampaha, **KL**: Kalutara, **KD**: Kandy, **ML**: Matale, **NE**: Nuwara Eliya, **GL**: Galle, **HB**: Hambantota, **MT**: Matara, **JF**: Jaffna, **KN**: Killinochchi, **MN**: Mannar, **VA**: Vavuniya, **MU**: Mullaitivu, **BT**: Batticaloa, **AM**: Ampara, **TR**: Trincomalee, **KM**: Kalmunai, **KR**: Kurunegala, **PU**: Puttalam, **AP**: Anuradhapura, **PO**: Polonnaruwa, **BD**: Badulla, **MO**: Moneragala, **RP**: Ratnapura, **KG**: Kegalle.

Data Sources:

Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Neonatal Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps., Rubella, CRS,

Special Surveillance: AFP* (Acute Flaccid Paralysis), Japanese Encephalitis

CRS** =Congenital Rubella Syndrome

Dengue Prevention and Control Health Messages

Look for plants such as bamboo, bohemia, rampe and banana in your surroundings and maintain them

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ON STATE SERVICE

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