



**Report of the One day campaign on
“Anti-Microbial Resistance: Situation, Needs and
Priorities in India”**

29th August 2015

Organized by:



Supported by:



Rapporteurs:

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<http://www.venturecenter.co.in/campaigns/amr/>

A one day campaign workshop on Anti-Microbial Resistance (AMR) was organized by Bioincubator, Venture Center, Pune on Saturday, 29th August 2015. This workshop aimed to bring together clinicians, social innovators and technologists to facilitate discussion on needs and intervention priorities in the broad field of antimicrobial resistance. This workshop was supported by DBT-BIRAC and the Social Innovation Immersion Programme at Venture Center.

*Campaigns (www.venturecenter.co.in/campaigns)
Facilitating technology commercialization and entrepreneurship*

Key sessions in this workshop were planned as follows

- Overview of key issues/ challenges in various areas of AMR
- Discussions on steps taken at the national level for tackling AMR.
- Panel consisting of clinicians discussed their experiences and insights in need identification, definition and prioritization for developing new solutions for interventions in the field of AMR.
- Information on new emerging opportunities.



Introduction

Anti-Microbial Resistance (AMR) is said to occur when microbes (bacteria, parasites, viruses and fungi) are less treatable with one or more drugs used to treat infection. Infections with resistant organisms are difficult to treat, and when treatable often requiring costly and sometimes toxic alternatives. It is an increasingly serious threat to global public health that requires action across all government sectors and society. New resistance mechanisms are emerging and spreading globally.

In this background, through this campaign on Anti-Microbial Resistance (AMR), the aim was to network all stakeholders to help initiate useful projects, start-ups etc related to AMR. This workshop was part of a campaign of Venture Center to nucleate and nurture AMR related startups in the Pune region. The workshop was aligned intentionally with the announcement of emerging opportunities so as to help facilitate startup creation and to make aware the participants about such opportunities related to AMR.

Workshop aimed to:

- Explore potential industry-academia/research partnerships in technology development and advancement.
- Foster networks with industry/academic experts/doctors/entrepreneurs
- Introduce some emerging opportunities including the UK-India AMR DxC competition 2016.

Workshop outline in Appendix 1.

Session I

The first session of the workshop was based on overview, opportunities and challenges in developing technologies in the field of AMR. Dr. Ramesh Paranjape, (former director of National AIDS Research Institute, Pune) started the session with statistics on AMR from major Indian cities and contrasted them with prevalence in other areas such as South Africa. He also discussed and emphasized on occurrence of AMR in commensal and pathogenic organisms. He highlighted several systemic and cultural aspects that lead to increased use and misuse of antibiotics in Indian demography such as unavailability of



appropriate antibiotics in low resource settings, high patient expectations from available drugs, non-compliance of the patient and low level ongoing viral replications for anti-retroviral drugs. Dr. Paranjape further discussed the issue of anti-retroviral drug resistance and available detection technologies for the same. At present 8 million people are on Anti-Retroviral Therapy for HIV. These detection technologies employed for detecting AMR in ART are mainly phenotypic and genotypic assays to detect minor or major mutations in HIV drug resistance. At present two genotypic assays are commercially available: Viro and Virologic. He emphasized the need of more such point-of-care diagnostic assays for detection of AMR in diseases like malaria, AIDS, STIs and Kala-Azar.

The second talk in this session was given by Dr. Kamini Walia, who is a scientist at ICMR, New Delhi and is currently involved in establishing a nationwide Antimicrobial Surveillance Network to understand the quantum of the issue. Dr. Walia, joined the audience over skype and briefed on various steps being taken by ICMR for putting together the surveillance network. Currently a linux based platform for surveillance is being developed by the ICMR. ICMR is currently on WHO-NET platform which has some deficiencies concerning the kind of data analysis they want to do, hence a new platform is being developed, while maintaining compatibility with WHO-NET. She also discussed about 6 nodal centers that have been identified by ICMR for this initiative. The function of these nodal centers ranges from carrying out phenotypic tests to training clinicians and health workers on risks of AMR. Dr. Walia discussed in detail the AMR status of *Shigella spp.* and mutations in the *CTX* gene that enhance the risk of cephalosporin resistance. Status of drug resistance in *Salmonella typhi* and non-fermenting gram negative bacilli was also discussed with a special emphasis on prevalence of gram negative bacteria (*Klebsiella* and *Acinetobacter*) in neonatal sepsis. She emphasised on two pressing needs in the area

- a) Requirement for rapid diagnostics in field of AMR and



- b) Requirement for interventions in the field of infection control.

Session II

The next session was designed to highlight AMR in commonly occurring widespread diseases such as tuberculosis, malaria and nosocomial infections.

First talk of this session was given by Dr. Renu Bhardwaj, Professor and Head, Department of Microbiology, B J Government Medical College, Pune. She opened her talk with major drivers of AMR. She presented insights on several causes such as:

- a) Non-standardized volume percentage of antibiotics in tablets from different pharma companies (example: ciprofloxacin where amount of antibiotic per tablet was noticed to be lower than what the label claimed.)
- b) Sale of antibiotics without prescription by pharmacists and some health workers (example: sale and consumption of Norflox in case of UTIs without proper medical consultation).
- c) Over prescription of antibiotics by doctors and other medical professionals (example high carbapenem sales in India as compared to USA)



Dr. Bhardwaj laid down some major and urgent requirements to tackle AMR in our country.

These included:

- a) Innovations in surveillance technologies for identifying and tracking AMR.
- b) Establishment of an Anti-microbial Resistant isolate bank
- c) Development of new drugs and antibiotic molecules for tackling mutated and drug resistant pathogens
- d) Development of novel anti-infectives such as bacteriophages and use of silver nanoparticles to explore new avenues of dealing with infections.

During the next talk, Dr. Prakash Doke (former Director of Health Services, Government of Maharashtra) emphasized on status of drug resistance in malarial pathogens with special attention towards *Plasmodium falciparum*. He emphasized on statistical correlation between mutations in *pfkelch13* gene and artemisinin resistance and mutations in *pfmdr1* gene for mefloquine resistance. Dr. Doke reiterated the need for interventions in methods of measuring parasitemia and drug resistance.



The final talk in this session was given by Dr. Rohini Kelkar who is a Professor and Head of Department of Microbiology at Tata Memorial Center, Mumbai. Dr. Kelkar discussed the prevalence of AMR in microbial pathogens in cancer patients. She also emphasized on one of the major drivers of AMR being over prescription of antibiotics for surgical site infections and other ICU patients.



Session III

Session III was a panel discussion amongst Dr. Anup Anvikar (Scientist, National Malaria Research Institute, ICMR, New Delhi), Dr. Vijay Nema (Scientist and In-charge, Molecular Biology, National AIDS Research Institute, Pune), Dr. Anju Kagal (Professor, Dept of Microbiology, B J Medical College, Pune), Dr. Sandeep Kadam (Pediatrician and Neonatologist, KEM Hospital, Pune) and Dr. Prakash Doke (former Director of Health Services, Government of Maharashtra). The session was chaired by Dr. Ramesh Paranjape, (former director of National AIDS Research Institute, Pune). The panel discussion focussed on need of tech interventions in various areas



of AMR. One of the major needs discussed were tracking of misuse and non-compliance at patient's end and doctor's end. Another major identified need was that of interventions in therapeutics in the field of new drug molecule development and also engineering targeted drug delivery systems to avoid prolonged use of antibiotics. Also, exploration of newer methods of

therapy such as use of probiotics and lactoferrins (especially in the case of neonatal sepsis) and use of silver nanoparticles was advocated. The panel also discussed, often overlooked area of



AMR in poultry and animal husbandry sectors. There has been a presence of certain amount of antibiotic molecules in water and food consumed by the Indian population and that also poses a severe threat of drug resistance. In the field of diagnostics, need for rapid assays to detect and

track drug resistance in various pathogens was agreed upon. Also, faster and newer ways for drug susceptibility testing which can be made available at low resource settings was also noted. Key areas of technology interventions are listed in Appendix 2.

Session IV

The fourth session involved discussion about emerging opportunities in the area of AMR. During this session, a talk was given over Skype by Dr. Till Bachmann who is Reader in Personalized Medicine in Infectious Diseases in the Division of Pathway Medicine at University

An overview of emerging opportunities: AMR DxC UK-India competition 2016

Till T. Bachmann
Reader in Personalised Medicine in Infectious Diseases
Deputy Head
Division of Infection and Pathway Medicine
The University of Edinburgh

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of Edinburgh, UK. He discussed few emerging opportunities in this field in form of the Longitude Prize and AMR DxC UK-India competition. He also briefed about the opportunity to participate in UK-India Autumn School on AMR resistance. He described the various timelines regarding the participation in the Autumn school and in the UK-India AMR DxC competition. Participants interacted and posed several questions to Till to clear their doubts.

The campaign workshop on AMR concluded with insights from two incubatees at Venture Center, Pune: Mr. Nishant Kumar (Founder Embryyo Technologies) and Mr. Sachin Dubey (co-founder Module Innovations) on their participation experiences in various competitions nationally and internationally.



The workshop concluded with a note on thanking the speakers for sparing their valuable time and the participants for their active participation.

Appendix 1: Workshop Outline

Time	Session title	Faculty
0900-0930	Registration : Foyer Area	
0930-0945	Welcome to Venture Center BioIncubator. Introduction to the workshop.	Pradnya Aradhya
0945-1100	Session 1: Set the stage: Overview, opportunities and challenges in developing technologies in the area of AMR AMR network at ICMR (over skype)	Ramesh Paranjape Kamini Walia
1100-1130	Networking tea: Foyer Area	
1130-1300	Anti-Microbial Resistance in: <ul style="list-style-type: none"> • Mycobacterium Tuberculosis • Malaria • Hospital Acquired Infections 	Renu Bharadwaj Prakash Doke Rohini Kelkar
1300-1400	Lunch Break: Innovation Cafe	
1400-1515	Panel discussion: Identification and stream lining of certain key issues related to AMR <ul style="list-style-type: none"> • Defining problems and areas where technology interventions are needed • Exploring user-friendly solutions for using in the community set up • Where will technology intervention work within a reasonable time frame and cost? • Ideas for compilation and for the workshop white paper. 	Chair: Dr. Ramesh Paranjape Moderator: Premnath V Panelists: Vijay Nema, Anju Kagal, Sandeep Kadam, Anup Anvikar, Prakash Doke Rapporteur: Mugdha Lele
1515-1545	Networking tea: Foyer Area	
1545-1630	An overview of emerging opportunities: AMR DxC UK-India competition 2016 and Q & A regarding the competition (over skype)	Till Bachmann
1630-1645	Insights by winners of various competitions amongst the VC incubatees	Moderator: Mugdha Lele Incubatees: Nishant Kumar, Sachin Dubey
1645-1700	Closing comments and closure of the event	Manisha Premnath
1700-1730	Networking tea: Foyer Area	

Appendix 2: Key problem/ need areas requiring technology interventions:

Key Problem	Technology interventions required
Tracking and surveillance	<p>To measure occurrence of resistance</p> <ul style="list-style-type: none"> • Reliable and robust screening tools • Screening for occurrence in a community setting by studying sewage etc • Big data analytics <hr/> <ul style="list-style-type: none"> • Mechanisms to track antibiotics purchase to avoid misuse of antibiotics <hr/> <ul style="list-style-type: none"> • Big data analytics
Therapeutics	<ul style="list-style-type: none"> • New molecules for antibiotics <p>New therapeutic approaches:</p> <ul style="list-style-type: none"> • Silver nanoparticles, propolis etc • Probiotics, prebiotics, etc • Multi-target formulations • combination therapies • Natural extracts and products • Adjuvants, controlled drug delivery, targeted drug delivery for increased potency, targeted action, reduced dose etc • Rotating 2-3 antibiotics in series during therapy
Guide for treatment and doctors	<p>Indicators for stopping treatment; “exit policy”</p> <ul style="list-style-type: none"> • Quick and affordable ways to identify or eliminate cause of disease; ex – cause of a sore throat • Faster and robust susceptibility testing • Strategies to reduce total duration of treatment
Reducing chances of infection	<ul style="list-style-type: none"> • Disinfection in hospitals • Sanitation techniques • Ventilation (esp in context of TB) • Ventilators in pulmonary infections
Antibiotics around us	<p>Antibiotics use in animal husbandry and poultry</p> <ul style="list-style-type: none"> • Alternative approaches such as use of probiotics etc • Alternatives to addition of antibiotics to feed and water <p>Tools to measure and remove</p> <ul style="list-style-type: none"> • antibiotics from landfills and in wastes • antibiotics as effluents from pharma manufacturing plants • antibiotics in personal care products <hr/> <ul style="list-style-type: none"> • Reducing wastage of antibiotics by designing better ways for adequate supply without excess
Diagnostics	<ul style="list-style-type: none"> • PoC diagnostics to determine specific infections in the community

	and hospital settings for quick therapeutic response
	<ul style="list-style-type: none">• Tools to measure development of antibiotic resistance, helping in tailoring treatment• Novel biomarkers which can be useful as PoC diagnostics• Diagnostics for susceptibility testing
Vaccines	<ul style="list-style-type: none">• Effective vaccines to avoid occurrence of infections
Ensuring compliance	<ul style="list-style-type: none">• New ideas to ensure compliance by patient and ensuring completion of the full course of treatment
