

**KARSAP –**  
**Kerala Antimicrobial Resistance**  
**Strategic Action Plan**  
**– One Health approach**

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Govt Medical College Trivandrum  
State Nodal Officer for AMR

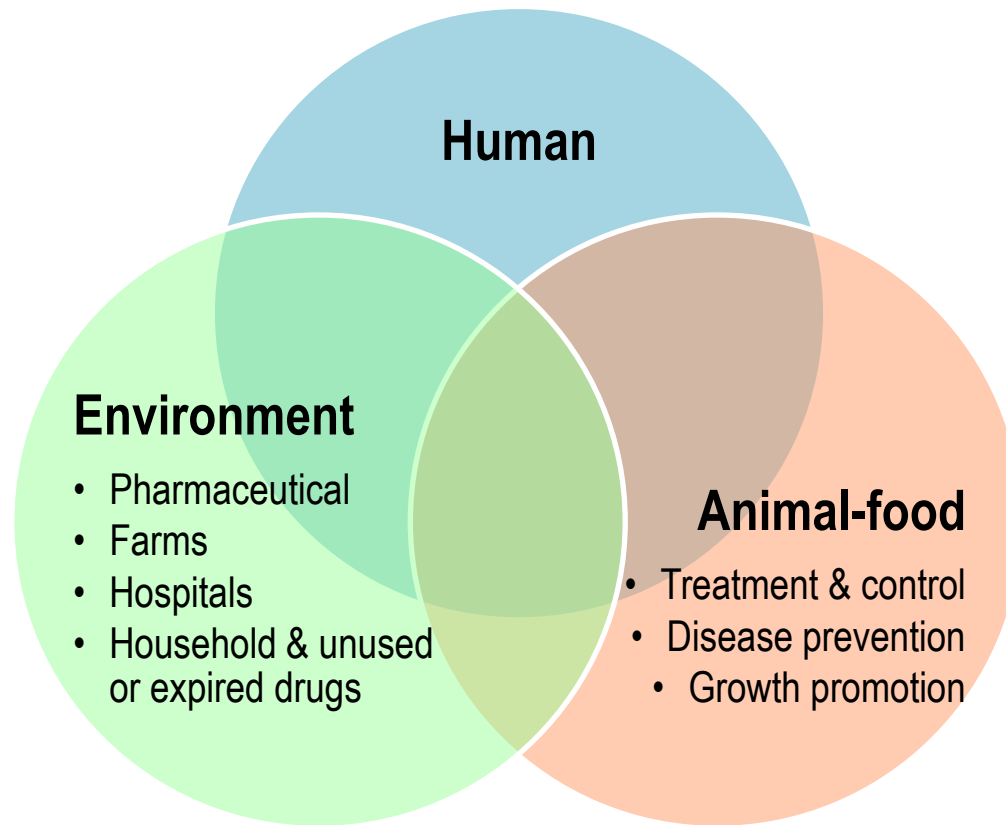
# Outline

1. Administrative process that went into making the plan
2. KARSAP
3. From Plan to action -Key initiatives taken by Kerala in containment of AMR
4. Issues & challenges in the process of devpt of KARSAP

# **Driving forces that led to the success of Kerala's State action plan are**

- Strong political commitment
- Efficiency ,knowledge & leadership of ACS (Health )
- Unwavering support from WHO country office for India at all stages of development & now in the process of implementation
- Team work of all the stakeholders

# Antimicrobial resistance is a complex issue



**Major health, food security, environment & economic threat**

# Major drivers of AMR in Kerala

- Use, misuse and abuse of antibiotics in humans
- Indiscriminate use of antibiotics in livestock & aquaculture –for growth promotion & disease prevention- spread of food borne AMR pathogens
- Recent studies - Colistin resistant bacteria with mgrB mutation in food samples
- Health dept requested AHD – banning of Colistin
- Large number of inland fisheries – specific for kerala
- Standards for tolerance of antibiotic residues – sea food ,shrimp export

# Kerala specific AMR challenges





70% of the total antibiotic use is in animal husbandry

Use of antibiotics as growth promoters in farm animals needs to be curbed to prevent the emergence of AMR



# Major drivers of AMR in Kerala....

- Use of animal manure in soil, inadequate treatment of effluents containing antibiotic residue from pharmaceutical industry, farms & HC facilities
- Waste water management inadequate – contaminating natural drinking water sources-KSPCB-antibiotic residues in water bodies
- Kerala is a consumer state for pharmaceuticals-
- Drugs control Dept - Regulation of production & sale of antibiotics is weak, OTC sale of antibiotics , circulation of counterfeit & substandard antibiotics – poorly dealt with .

# Background

- Kerala identified AMR as a problem years back
- Drug resistant infections – longer hospital stay, increased medical cost & higher mortality
- Steps were taken to strengthen surveillance in all Govt Medical Colleges from 2012 onwards
- Antibigrams prepared by Microbiology depts
  - standard treatment guidelines/antibiotic policy was devised for all Medical colleges

# Initiation of KARSAP

- 24–25 Aug 2017, New Delhi
  - National Consultation to operationalize action plan for AMR containment
- 11 Oct 2017, TVM
  - Review meeting on AMR by Hon'ble CM

# State Workshop on AMR

17 Oct 2017

- Organized by Department of Health and Family Welfare
- Stakeholders engaged from animal husbandry, agriculture, fisheries, food, environment, drug regulator, research and civil society
- Main objectives- to share information on AMR & to initiate development of SAP-AMR
- “One Health approach” for AMR containment

# State Workshop on AMR



# WAAW activities

13–19 Nov 2017



**CME ON GOOD ANTIBIOTIC PRESCRIPTION PRACTICES AND INFECTION CONTROL**



# World Antibiotic Awareness Week

13<sup>th</sup> Nov to 19<sup>th</sup> 2017-SSB SEMINAR HALL

**THEME - "SEEK ADVICE FROM A QUALIFIED HEALTH CARE PROFESSIONAL BEFORE TAKING ANTIBIOTIC"**



# AMR activities

- 15 Dec 2017  
Review meeting comprising all stakeholders
  - Report on AMR awareness/training activities in Kerala during the WAAW
  - Governance mechanisms – **State AMR core committee** formed for AMR & KARSAP
  - Finalized the draft action plan – submitted to the Govt
- 4 Jan 2018, RGCB  
Workshop on AMR Research



GOVERNMENT OF KERALA  
Abstract

Health & Family Welfare Department – Working Committee on Antimicrobial Resistance  
with Terms of Reference - Constituted - Orders issued.

**HEALTH & FAMILY WELFARE (F) DEPARTMENT**

G.O(Rt.)No.3553/2017/H&FWD

Dated, Thiruvananthapuram, 18.12.2017

**ORDER**

Antimicrobial Resistance (AMR) is emerging as a major threat to health sector in Kerala. The problem has dimensions that go beyond healthcare provision. Other sectors such as Fisheries, Veterinary and Dairy are important partners in managing Antimicrobial Resistance in the State. Therefore creating a common platform to improve the situation of AMR is of absolute importance.

In the circumstances, Government are pleased to constitute a Working Committee with the following members:

1. Additional Chief Secretary, Health & Family Welfare Department
2. Director of Health Services, Thiruvananthapuram
3. Director of Medical Education, Thiruvananthapuram
4. Director, Indian Systems of Medicine, Thiruvananthapuram
5. Director, Homeopathy, Thiruvananthapuram
6. Director, Animal Husbandry Department, Thiruvananthapuram
7. Director, Fisheries Department, Thiruvananthapuram
8. Director, State Public Health Laboratory, Thiruvananthapuram
9. Commissioner of Food Safety, Thiruvananthapuram
10. Chairman, Kerala State Pollution Control Board, Thiruvananthapuram
11. Registrar, Kerala Veterinary and Animal Sciences University (KVASU)
12. Registrar, Kerala University of Fisheries and Ocean Studies (KUFOS)
13. Dr. Sharada Devi, Professor and Head of Department, Microbiology,  
Government Medical College, Thiruvananthapuram - **Convenor**
14. Nominee of the Indian Medical Association, Thiruvananthapuram
15. Nominee of the Department of Science and Technology
16. Nominee of Director, Rajiv Gandhi Center for Biotechnology,  
Thiruvananthapuram
17. Dr.A.V.Jayakrishnan, Former President, Indian Medical Association, Kerala
18. Dr.Sohan Lal, Microbiologist, MIMS Hospital, Kozhikode
19. Dr.Sanjeev K Singh, Medical Superintendent, Head ( Infection Control and  
Quality & Standards), Amritha Institute of Medical Sciences, Kochi, Kerala

The Terms of the reference of the Working Committee is as follows:

1. Create surveillance systems to generate data on AMR prevalence and the trend of growth of AMR prevalence in Kerala.
2. Develop multisectoral strategies to reduce AMR in the state.

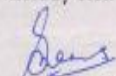
3. Periodically review the data and to monitor implementation of prevention and management strategies.
4. Receive inputs from the working group on research and incorporate them in the prevention and management strategies.

(By order of the Governor).  
**RAJEEV SADANANDAN**  
Additional Chief Secretary to Government

To

Director of Health Services, Thiruvananthapuram  
Director of Medical Education, Thiruvananthapuram  
Director, Indian Systems of Medicine, Thiruvananthapuram  
Director, Homeopathy, Thiruvananthapuram  
Director, Animal Husbandry Department, Thiruvananthapuram  
Director, Fisheries Department, Thiruvananthapuram  
Director, State Public Health Laboratory, Thiruvananthapuram  
Commissioner of Food Safety, Thiruvananthapuram  
Chairman, Kerala State Pollution Control Board, Thiruvananthapuram  
Registrar, Kerala Veterinary and Animal Sciences University (KVASU), Wayanad  
Registrar, Kerala University of Fisheries and Ocean Studies (KUFOS), Kochi  
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Dr.Sohan Lal, Microbiologist, MIMS Hospital, Kozhikode  
Dr.Sanjeev K Singh, Medical Superintendent, Head ( Infection Control), Amritha  
Institute of Medical Sciences, Kochi, Kerala  
President, Indian Medical Association, Thiruvananthapuram  
The Principal Accountant General (A&E), Kerala, Thiruvananthapuram.  
The Principal Accountant General (Audit), Kerala, Thiruvananthapuram.  
Department of Science and Technology, Thiruvananthapuram  
1 & PRD (Web & Newmedia), Government Secretariat  
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Forwarded/By Order

  
Section Officer

**18 Dec 2017**

**Working Committee on AMR  
revised; with well-defined terms  
of reference**

# Governance mechanism – Working Committee on AMR

## Terms of Reference

- Create surveillance systems to generate data on AMR prevalence and the trend of growth of AMR prevalence in Kerala
- Develop multi-sectoral strategies to reduce AMR
- Periodically review the data and to monitor implementation of prevention and management strategies
- Receive inputs from the working group on research and incorporate them in the prevention and management strategies

# AMR activities

- 22–24 Jan 2018, CSE:  
Asia-Africa workshop on NAP-AMR implementation focusing on animal & environmental aspects of AMR. Challenges & issues in NAP implementation – various countries
- 18 Apr 2018: Workshop on role of private sector & NGO stake holders-CSE, ReAct
- 10 Jul 2018: IPC activities reviewed-Link nurses
- 27-28 Sept: Workshop on integrated surveillance for AMR & Management of pharmaceutical waste- KSPCB, CSE & DSP

# holders in KARSAP

# 18 April 2018



# Review of IPC activities

10 July 2018



# KSPCB, CSE & DSP workshops

**27 Sep 2018, KSPCB & CSE: Workshop on Integrated Surveillance for AMR**

**28 Sep 2018, KSPCB & DSP: Workshop on Management of Pharmaceutical Waste**





GAP-AMR

- 2015

NAP-AMR

- 2017

KARSAP

- 2018



# Launch of KARSAP by Hon'ble CM

## Oct25 2018





# **Kerala Antimicrobial Resistance Strategic Action Plan**

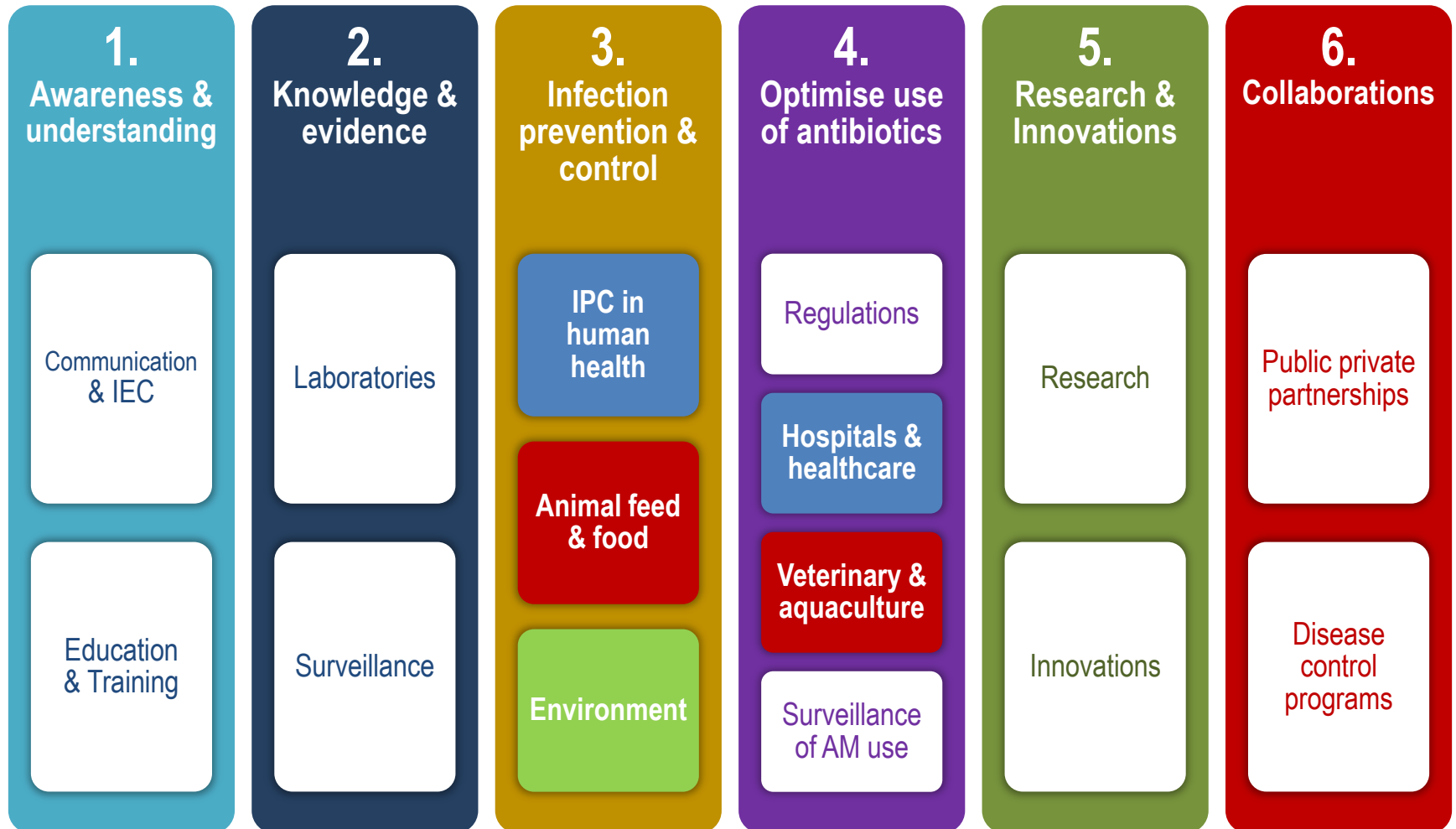
**One Health response to AMR Containment**



Jointly developed by the Departments of Agriculture Development  
& Farmers' Welfare, Animal Husbandry, Environment, Fisheries,  
and Health & Family Welfare

**Government of Kerala**

# KARSAP strategic priorities & focus areas



# Awareness and understanding

- **AMR awareness campaigns** are being conducted at all GMCs targeting students & all HCWs.
- **Routine AMR demonstrations** - in various OPDs to sensitize the patients and bystanders regarding the optimal use of antibiotics- ReAct Asia Pacific
- **A structured questionnaire** based survey - the AMR awareness among patients & bystanders attending the OPD.
- **Standard online survey** -to assess the KAP of HCWs & vets on AMR

# Activities ongoing

- In collaboration with K-DISC , the Antibiotic policy ,std treatment guidelines of various Medical Colleges are being converted in to an user friendly App format  
Antibiotic Stewardship modules are also being developed -
- Whole genome sequencing of the Colistin resistant clinical isolates in the state –Research partner – RGCB
- ReAct- Wokshop on AMR for nonhuman sectors, civil society, media professionals

# AMR surveillance

- For assessing the burden of AMR & for providing the information for action in support of local, national & global strategies
- AMR surveillance in human, animal, food & environment
- GMCT is part of National Program on containment of AMR conducted by NCDC
- State coordinating centre for AMR surveillance- dept of Microbiology- GMCT

# KARS-NET meeting – private MCs & Labs

Feb 21st 2019



# KARS-NET Workshop

6<sup>th</sup> May 2019



# Strengthen Microbiology labs to detect AMR -

- All the 5 old Govt MCs Micro labs strengthened
- Provide timely, reliable, and reproducible ID and AST results
- Broaden use of [validated rapid diagnostic and rapid AST](#)
- Promptly report unusual patterns of resistance

# Rapid diagnostics & the cumulative antibiogram

- Combining results from rapid diagnostic tests with antibiograms can lead to the selection of more targeted empiric therapy
  - Shorten time to effective antimicrobial therapy
  - Reduce inappropriate antimicrobial usage
  - Decrease mortality
  - Decrease hospital and ICU length of stay
  - Decrease hospital costs
  - Decrease resistance

# Many New Tools – Growing Options



\*\*\*Not all platforms displayed are FDA cleared.

# AMR surveillance – Kerala

1. GMC Trivandrum
2. GMC Kozhikode
3. GMC Thrissur
4. GMC Kottayam
5. GMC Alappuzha
6. GMC Ernakulam
7. GMC Manjeri
8. GMC Kollam
9. GH Ernakulam
10. State PH Lab,  
Trivandrum

16 more private labs & private Medical colleges agreed  
to be part of KARS-NET

# AMR surveillance

## **Identification of infections of public health importance for surveillance**

1. Blood stream infections (BSIs)
2. Skin and soft tissue infections (SSTI)
3. Respiratory tract infections (RTIs)
4. Urinary tract infections (UTI)

# 6 pathogens for AMR surveillance

1. *Acinetobacter* spp

2. *E. coli*

3. *Klebsiella* spp

4. *Pseudomonas aeruginosa*

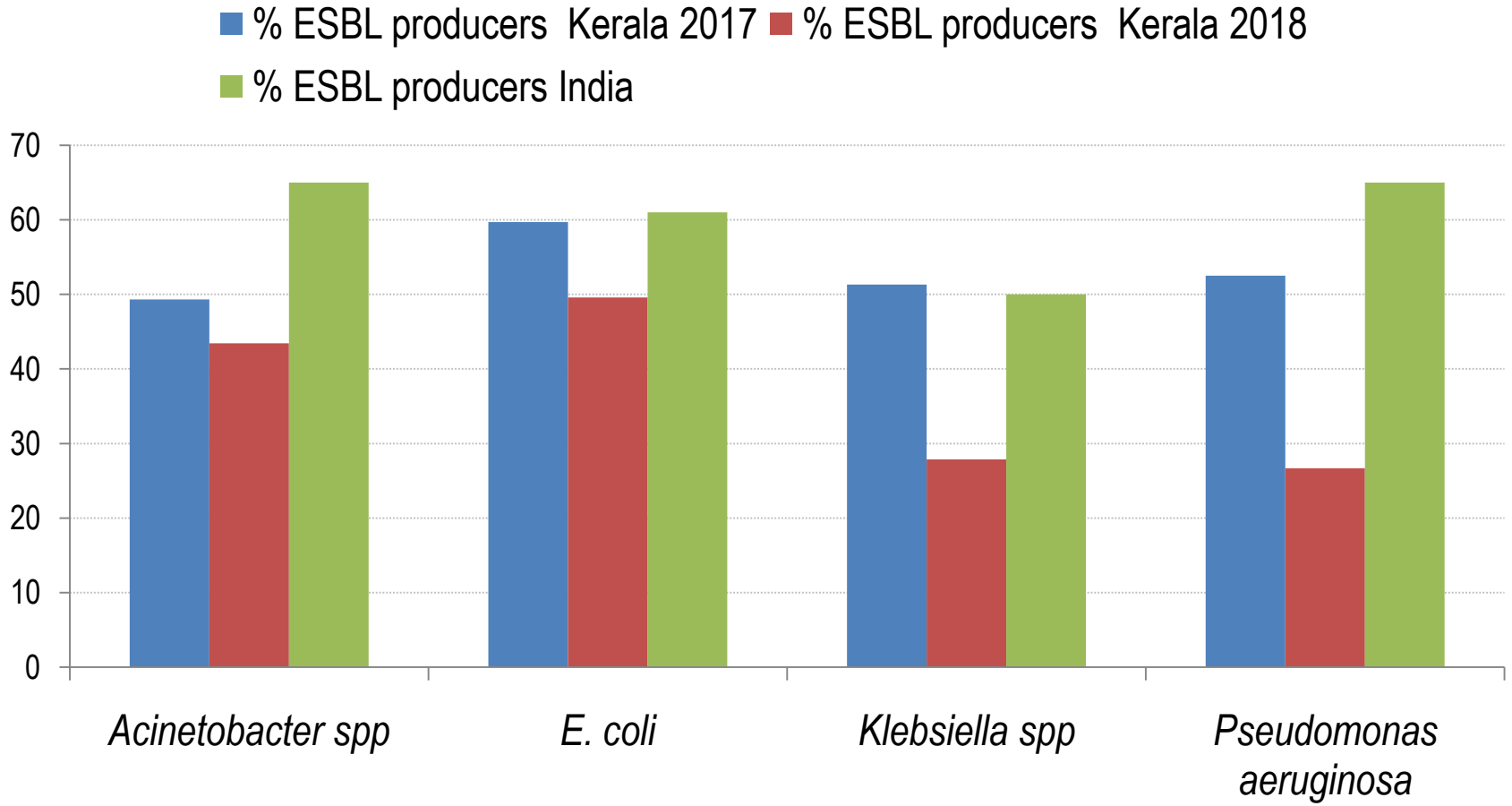
**GNB**

5. *Staphylococcus aureus*

6. *Enterococcus* spp

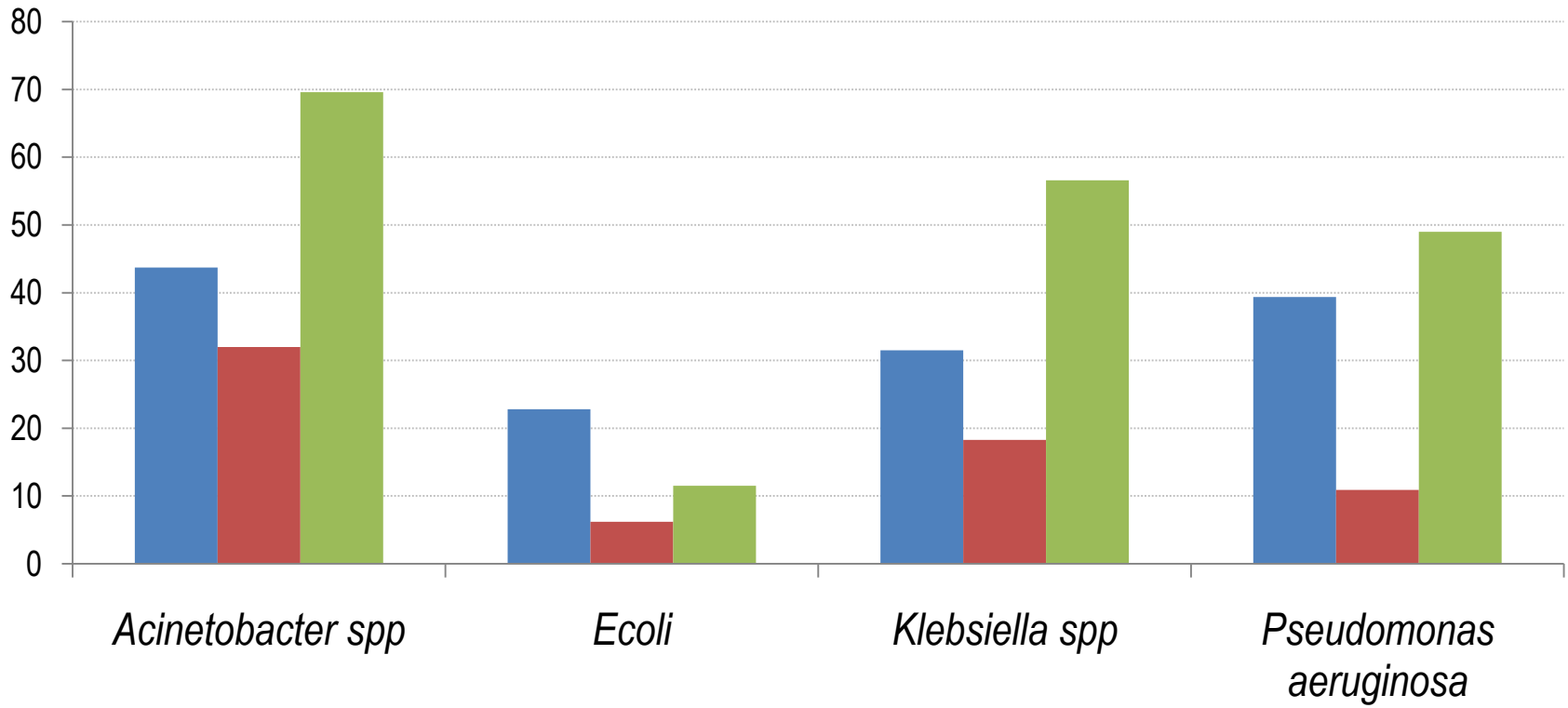
**GPC**

# ESBL production



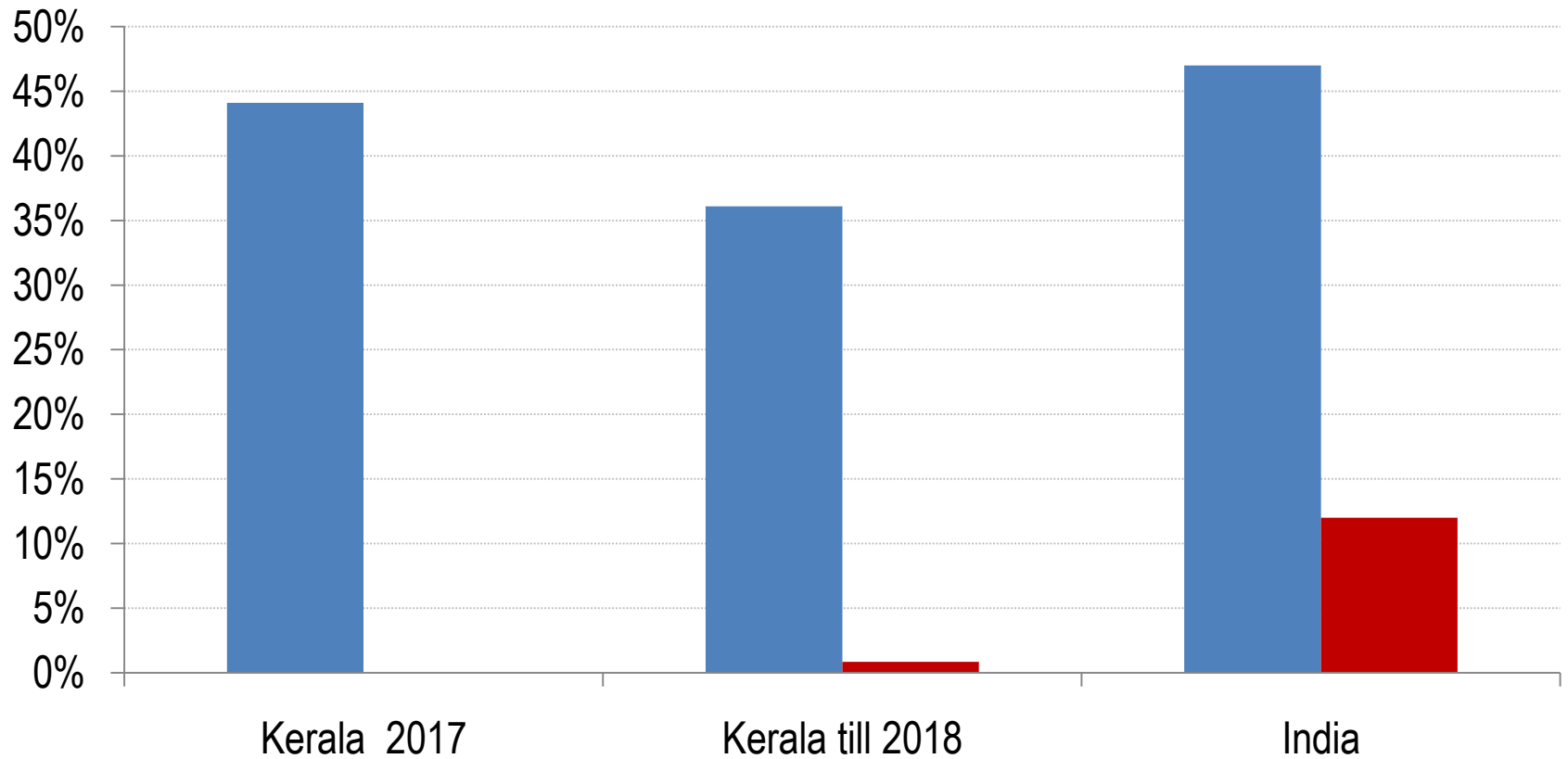
# Carbapenem resistance

■ Carbapenem resistance Kerala 2017 ■ Carbapenem resistance Kerala 2018  
■ Carbapenem resistance in India



# Gram positives

■ MRSA ■ VRE



# Infection prevention & control

- Microbiology & ID Dept of GMCT - the nodal centre for coordinating IPC activities in the state.
- Regular workshops/training programs on IPC are organized in all MCs as well as hospitals under DHS.
- Sensitizations programs
- The HAI surveillance rates - compared with INICC rates & NHSN rates.
- Steps – to assess the number of commercial farms complaint with IPC guidelines & good practices.
- to ensure that AMR issues have been incorporated in biosecurity guidance for farms & slaughter houses.

# HAIs

- Most XDR & PDR HAI are in post antibiotic era, hence our focus is on HAI P & C than HAI treatment
- **Investing in infection control is the need of the hour**  
1 dollar spent on IPC translates to 246 dollars saved in patient care\*
- HAI surveillance data – VAP, CAUTI, CLABSI ,SSTI – [link nurses](#) from ICUs

\* Study by Sanjeev Singh, et al from AIMS

# Optimizing use of antibiotics

- **ASP committees** - GMCs & major hospitals under Health service.
- **Antibiotic policy** of all GMCs are being updated on the resistance trends. **ASP committee** meetings monthly - compliance of institution's Antibiotic policy. Antimicrobial check list is going to be piloted in GMCT
- One Pharmacologists - GMCs - training in Clinical Pharmacology by Dr Sujith Chandy at CMC Vellore. **Antibiotic prescription audit started** .
- The DDDs & DOTs of WHO Watch & restricted antibiotics –GMCT

- The antibiotic utilization rates with respect to WHO access, watch, and restricted antibiotics - calculated in GMCT OPD. The Clinical Pharmacist - NCDC - AMC tool- WHO
- Routine training to retail pharmacists is --under the leadership of State Drug Controller.
- The total antibiotic consumption in the state is monitored & the quality of drugs is periodically checked by the State Drugs Controller.
- A drug disposal initiative - All Kerala Chemists & Druggists association (AKCD)

# Pan drug resistant microbes

- Colistin resistance – a reality in Govt Medical Colleges & also in GH Ernakulam – Whole genome sequencing done by RGCB- strain belonging to ST78. Published - journal of Global AMR in April 2019
- Last line antibiotic for treating PDR Klebsiella is i/v Fosomycin (INR 24,000/day) for 7–14 days
- Majority cannot afford – results in mortality due to PDR bacteria. Reason – referral of terminally ill pts from corporate hospitals
- Automated rapid diagnostics need of the hour – ASP, auditing, de-escalation only then possible

# Research & innovations

- RGCB is the research partner of KARSAP.
- Research on AMR in **Fisheries** - CIFT, KUFOS & Dept of fisheries Kerala .
- Research on the **environmental aspects** of AMR - coordinated by the KSPCB and Dept of Env't sciences Kerala University.
- Research in AMR on **livestock** – SLMAP. AHD launched antibiotic free “Kerala Chicken” tested for antibiotic residues
- Research in AMR in **Human health** is being conducted in all Govt MCs as well as in GH Ernakulam.

# Collaborations public –private partnership

- Integrated surveillance frame work for antibiotic resistance, residues & use in animal & environmental sector, has been formulated with the help of CSE & ReAct .
- AMR surveillance- Private hospitals & MCs
- HAI surveillance – soon to be initiated along with private institutions
- IPC sensitization activities across the State have been started by corporate partners & ReAct

# Activities undertaken by animal health sector under the framework of KARSAP

1. Monitoring of Antibiotic Residues in broiler chicken
2. AMR in Food and Food Animals (Meat, Milk, Poultry)
3. Awareness programs for Farmers/Vets
4. Distribution of antibiotic sensitivity kits to Veterinary Dispensaries/ Hospitals/Polyclinics under AHD by IH & VB, Palode (Aprox 5000 nos)
5. AHD dept. manual revised and reissued, this has recommended antibiotics for select disease & AMR expert committee of AHD constituted
6. Mapping and geo tagging of all animal farms along with individual animal identification --2.5laks farms

# Reducing environmental contamination with MDR pathogens & antimicrobial residues

- Identify environmental sources of infection and collect baseline data - KSPCB
- Improve housekeeping and environment management at hospitals & ensure appropriate bio-medical waste management
- Strengthen infrastructure including environment controls and sewage treatment plant with routine monitoring and surveillance (KSPCB, health institutions)
- Road map to waste water treatment for combating AMR for Kerala - developed

# Issues and challenges in implementation of KARSAP

- Human resources
- Role of anthropogenic activities in contaminating the natural water bodies
- Traceability problems with food of animal origin
- Over all weak governance & poor enforcement of policies & legislations
- Regular monitoring of antibiotic residues in food of animal origin & environment
- Regulation of quality of antimicrobials, OTC sale of antimicrobials & adherence to the Red line campaign of GOI - absence of credible drug regulations & law enforcement

**“ALONE WE CAN  
DO SO LITTLE;  
TOGETHER WE  
CAN DO SO MUCH.”**

- Helen Keller



Thank you