Task Force for AMR : An Initiative of GoI

Dr C.Wattal

Chairman

Dept of Clinical Microbiology & Immunology

Sir Ganga Ram Hospital

New Delhi

AMR Synonymous with global warming

- The speed with which our antibiotics are rendered ineffective it may not matter that we have antibiotics 5 years from now.
- In such case the fate of advances in medicine like liver, kidney, bone marrow, heart , stem cell Tx. and many more will take a nose dive.
- End result will be a decline in medical wonders
- And lack of faith in medicine of a common man

We need implementable policies to limit AMR

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Characterization of a New Metallo-β-Lactamase Gene, *bla*$_{NDM-1}$, and a Novel Erythromycin Esterase Gene Carried on a Unique Genetic Structure in *Klebsiella pneumoniae* Sequence Type 14 from India[▽]

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Emergence of a new antibiotic resistance mechanism in India, Pakistan, and the UK: a molecular, biological, and epidemiological study

Karthikeyan K Kumarasamy, Mark A Toleman, Timothy R Walsh, Jay Bagaria, Fazhana Butt, Ravikumar Balakrishnan, Uma Chaudhary, Michel Doumith, Christian G Giske, Seema Irfan, Padma Krishnan, Anil V Kumar, Sunil Maharjan, Shazad Mushtaq, Tabassum Noorie, David L Paterson, Andrew Pearson, Claire Perry, Rachel Pike, Bhargavi Rao, Ujjwayini Ray, Jayanta B Sarma, Madhu Sharma, Elizabeth Sheridan, Marudayam A Thirunarayan, Jane Turton, Supriya Upadhyay, Marina Warner, William Wolfare, David M Livermore, Neil Woodford

Summary

Background **Gram-negative Enterobacteriaceae with resistance to carbapenem conferred by New Delhi metallo-β-lactamase 1 (NDM-1) are potentially a major global health problem. We investigated the prevalence of NDM-1, in multidrug-resistant Enterobacteriaceae in India, Pakistan, and the UK.**

Methods **Enterobacteriaceae isolates were studied from two major centres in India—Chennai (south India), Haryana (north India)—and those referred to the UK's national reference laboratory. Antibiotic susceptibilities were assessed, and the presence of the carbapenem resistance gene bla_{NDM-1} was established by PCR. Isolates were typed by pulsed-field gel electrophoresis of XbaI-restricted genomic DNA. Plasmids were analysed by S1 nuclease digestion and PCR typing. Case data for UK patients were reviewed for evidence of travel and recent admission to hospitals in India or Pakistan.**

Findings **We identified 44 isolates with NDM-1 in Chennai, 26 in Haryana, 37 in the UK, and 73 in other sites in India and Pakistan. NDM-1 was mostly found among *Escherichia coli* (36) and *Klebsiella pneumoniae* (111), which were highly resistant to all antibiotics except to tigecycline and colistin. *K pneumoniae* isolates from Haryana were clonal but NDM-1 producers from the UK and Chennai were clonally diverse. Most isolates carried the NDM-1 gene on plasmids: those from UK and Chennai were readily transferable whereas those from Haryana were not conjugative. Many of the UK NDM-1 positive patients had travelled to India or Pakistan within the past year, or had links with these countries.**

Interpretation **The potential of NDM-1 to be a worldwide public health problem is great, and co-ordinated international surveillance is needed.**

Funding **European Union, Wellcome Trust, and Wyeth.**

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See Online/Reflection and Reaction DOI:10.1016/S1473-3099(10)70168-7

Department of Microbiology, Dr ALM PGIBMS, University of Madras, Chennai, India (K K Kumarasamy MPhil, P Krishnan PhD); **Department of Infection, Immunity and Biochemistry, School of Medicine, Cardiff University, Cardiff, UK** (M A Toleman PhD, Prof T R Walsh PhD); **Health Protection Agency Centre for Infections, London, UK** (J Bagaria MD, R Balakrishnan MD, M Doumith PhD, S Maharjan MD, S Mushtaq MD, T Noorie MD, A Pearson PhD, C Perry PhD, R Pike PhD, B Rao MD, E Sheridan PhD, J Turton PhD, M Warner PhD, W Wolfare PhD,

Dissemination of NDM-1 positive bacteria in the New Delhi environment and its implications for human health: an environmental point prevalence study

Timothy R Walsh, Janis Weeks, David M Livermore, Mark A Toleman

Summary

Background Not all patients infected with NDM-1-positive bacteria have a history of hospital admission in India, and extended-spectrum β-lactamases are known to be circulating in the Indian community. We therefore measured the prevalence of the NDM-1 gene in drinking water and seepage samples in New Delhi.

Methods Swabs absorbing about 100 µL of seepage water (ie, water pools in streets or rivulets) and 15 mL samples of public tap water were collected from sites within a 12 km radius of central New Delhi, with each site photographed and documented. Samples were transported to the UK and tested for the presence of the NDM-1 gene, bla_{NDM-1}, by PCR and DNA probing. As a control group, 100 µL sewage effluent samples were taken from the Cardiff Wastewater Treatment Works, Tremorfa, Wales. Bacteria from all samples were recovered and examined for bla_{NDM-1} by PCR and sequencing. We identified NDM-1-positive isolates, undertook susceptibility testing, and, where appropriate, typed the isolates. We undertook Inc typing on bla_{NDM-1}-positive plasmids. Transconjugants were created to assess plasmid transfer frequency and its relation to temperature.

Findings From Sept 26 to Oct 10, 2010, 171 seepage samples and 50 tap water samples from New Delhi and 70 sewage effluent samples from Cardiff Wastewater Treatment Works were collected. We detected bla_{NDM-1} in two of 50 drinking-water samples and 51 of 171 seepage samples from New Delhi; the gene was not found in any sample from Cardiff. Bacteria with bla_{NDM-1} were grown from 12 of 171 seepage samples and two of 50 water samples, and included 11 species in which NDM-1 has not previously been reported, including *Shigella boydii* and *Vibrio cholerae*. Carriage by enterobacteria, aeromonads, and *V cholera* was stable, generally transmissible, and associated with resistance patterns typical for NDM-1; carriage by non-fermenters was unstable in many cases and not associated with typical resistance. 20 strains of bacteria were found in the samples, 12 of which carried bla_{NDM-1} on plasmids, which ranged in size from 140 to 400 kb. Isolates of *Aeromonas caviae* and *V cholerae* carried bla_{NDM-1} on chromosomes. Conjugative transfer was more common at 30°C than at 25°C or 37°C.

Interpretation The presence of NDM-1 β-lactamase-producing bacteria in environmental samples in New Delhi has important implications for people living in the city who are reliant on public water and sanitation facilities. International surveillance of resistance, incorporating environmental sampling as well as examination of clinical isolates, needs to be established as a priority.

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See Comment page 334

Department of Infection, Immunity and Biochemistry, School of Medicine, Cardiff University, Heath Park, Cardiff, UK (Prof T R Walsh PhD, J Weeks BSc, M A Toleman PhD); University of Queensland Centre for Clinical Research, University of Queensland, Brisbane, Australia (Prof T R Walsh); and Health Protection Agency Microbiology Services, Colindale, London, UK (D M Livermore PhD)

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Knowledge is Strength

- We need to know in context of AMR

1. What to develop &
2. How to implement
3. Amount of AMR are we facing

- Once we know what is ailing us we are sure to treat it with all wisdom and strength.
- But imagine in absence of this knowledge what will be the outcome of our precious resource like antibiotic.

We will be groping in the dark

What is the magnitude of problem

- Hospital prevalence of NDM-1

  Few case reports

  Limited surveillance studies

  A small study has shown carbapenemase prevalence to be 5.2-7.8%, out of which 86% were NDM-1

- Community prevalence of NDM-1

  ?

Deshpande P, Shetty A, Kapadia F, Hedge A, Soman R, Rodrigues C. Clin Infect Dis. New Delhi metallo 1: have carbapenems met their doom? 2010 15;51(10):1222.

Prevalence of NDM-1 carbapenemase at SGRH: A pilot study of 5 months

The prevalence of NDM-1 was 6.7% (*E.coli*: wards), 13.3% *(E.coli*: ICU) 31.3% (*K. pneumoniae*: wards) and 38% (*K. pneumoniae*: ICU**)**

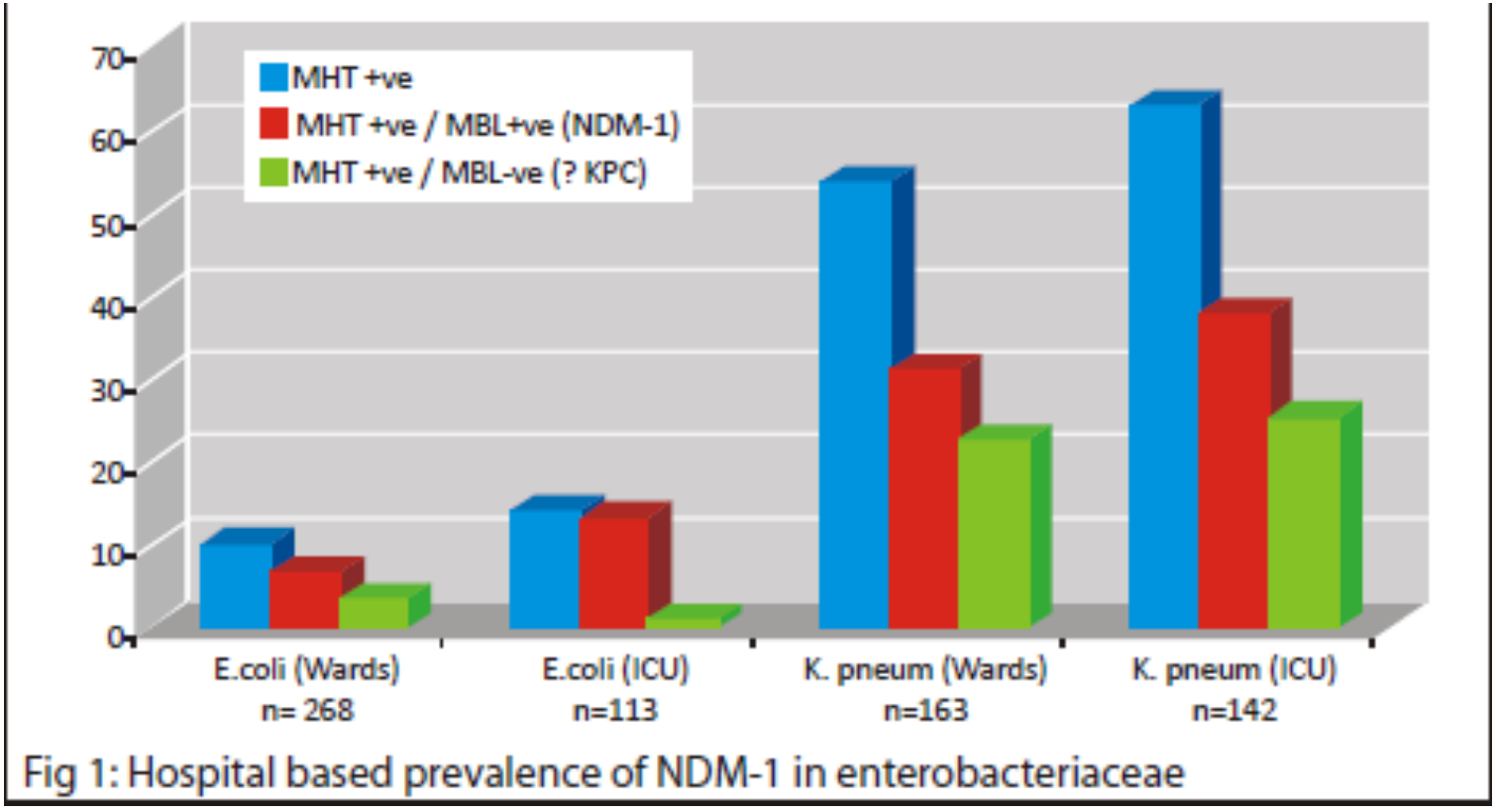
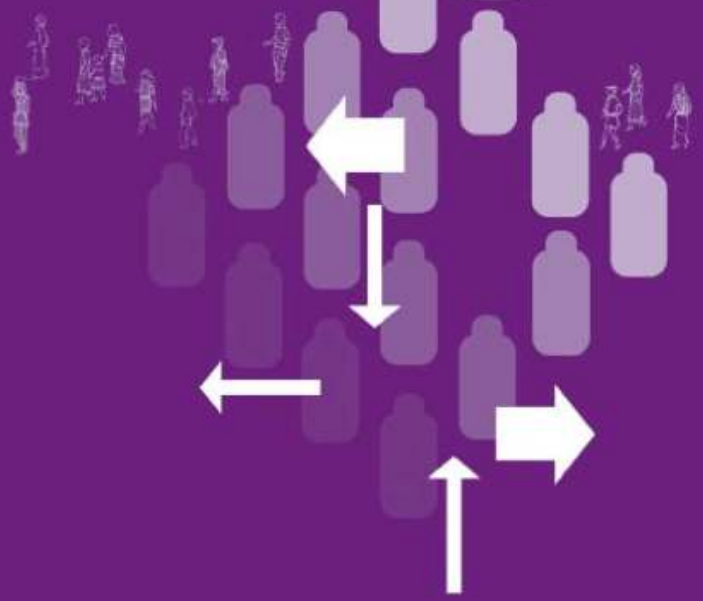


Fig 1: Hospital based prevalence of NDM-1 in enterobacteriaceae

Wattal et al. On going study funded by SGRH, Research Committee

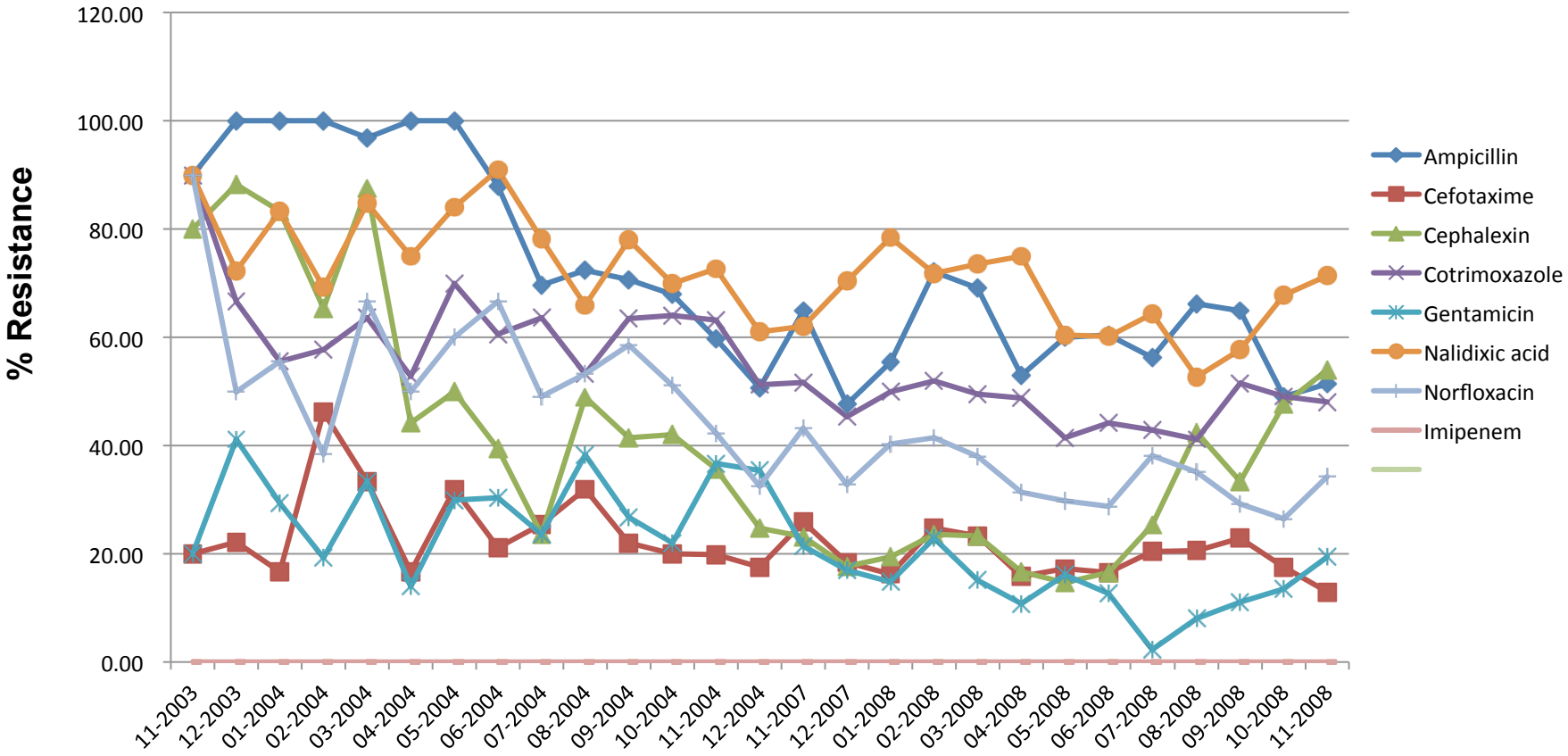
Community-Based Surveillance of Antimicrobial Use and Resistance in Resource-Constrained Settings

Report on five pilot projects



World Health Organization

CRE in Community E.coli Isolates: Delhi 2003-4, 2007-8



J Applied Therapeutic Research 7(2)2009; WHO/EMP/MAR/2009.2 ; Published on 03 May 2009 (124 pages); Under Review: IJMR 2011

Journal of
APPLIED THERAPEUTIC RESEARCH

Establishing a new methodology for monitoring of antimicrobial resistance and use in the community in a resource poor setting

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[5] *WHO, Geneva, Switzerland*

In-depth qualitative investigation to study antimicrobial use behaviour and suggestions for suitable interventions

Family Practice Advance Access published July 26, 2010

Family Practice 2010; 0:1–7
doi:10.1093/fampra/cmq059

Antibiotic use in the community: what factors influence primary care physicians to prescribe antibiotics in Delhi, India?

Anita Kotwani[a,*], Chand Wattal[b], Shashi Katewa[c], P C Joshi[c] and Kathleen Holloway[d]

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Journal of Clinical Pharmacy and Therapeutics

Journal of Clinical Pharmacy and Therapeutics (2011) doi:10.1111/j.1365-2710.2011.01293.x

ORIGINAL ARTICLE

Irrational use of antibiotics and role of the pharmacist: an insight from a qualitative study in New Delhi, India

A. Kotwani* PhD, C. Wattal† MD, P. C. Joshi‡ PhD, K. Holloway§ MRCP, PhD

*Department of Pharmacology, V. P. Chest Institute, University of Delhi, Delhi, †Department of Clinical Microbiology, Sir Ganga Ram Hospital, Rajinder Nagar, New Delhi, ‡Department of Anthropology, University of Delhi, Delhi and §Essential Drugs and Other Medicines, World Health Organization, Regional Office for South East Asia, New Delhi, India

To Develop Policies we need to know?

1. How to know what are we faced with in the name of antimicrobial resistance
2. What are the tools that can be used for monitoring AMR with reliable and reproducible results
3. How to interpret this information to formulate and implement policies

Task Force

Assess, Review and Suggest Measures
On
Antimicrobial Resistance

MoHFW GoI ceased with the problem

- One or more central Institutions under Ministry of Health made coordinating center at the national level depending on the lab network size
- Network of Hospital Based AST laboratories

National Policy for Containment of Antimicrobial Resistance in India 2010-11. http://ncdc.gov.in/ab_policy.pdf

FIVE TERMS OF REFERENCE OF THE TASK FORCE COMMITTEE

1. Review the current situation regarding manufacture, use and misuse of antibiotics in the country.
2. Design for creation of a National Surveillance System for antibiotic resistance.
3. Studies documenting prescription patterns and establish a monitoring system for the same.
4. Enforce and enhance regulatory provisions for use of antibiotics in human veterinary and industrial use.
5. Specific intervention measures such as rationale use of antibiotics and antibiotic policies in hospitals which can be implemented, as early as possible

www.nicd.nic.in/ncdc/new-ab_policy.pdf.url

MEMBERS OF TASK FORCE

- Dr. R. K. Srivastava DGHS-Chairperson
- Prof. Ranjit Roy Chaudhury, Member, Board of Governors, MCI
- Dr. N.K. Ganguly, President, JIPMER, New Delhi.
- Dr. S.K. Bramhachari, Director, CSIR, New Delhi.
- Dr. Surender Singh, Drugs Controller General of India, New Delhi.
- Dr. Randeep Guleria, Prof. of Medicine, AIIMS, New Delhi.
- Dr. Ajit Sinha, HOD, Safdarjang Hospital, New Delhi.
- Dr. Usha Gupta, Sr. Consultant, Clinical Pharmacology, Fortis Hospit
- Dr. Manish Kakkar, Public Health Foundation of India, PHD House
- Dr. Camilla Rodrigues, Consultant, Lab Medicine, Hinduja Hospital and Medical Research Centre
- Dr. Chand Wattal, Hony. Senior Consultant, Chairperson Department of Clinical Microbiology, Sir Ganga Ram Hospital, New Delhi.
- Dr. Anita Kotwani, Associate Professor, Deptt. of Pharmacology, Vallabhbhai Patel Chest Institute, Delhi
- Dr. R.L. Ichhpujani, Director NCDC, Delhi- Member Secretary

www.nicd.nic.in/ncdc/new-ab_policy.pdf.url

1. Monitoring Manufacturing ,Use and Misuse of antibiotics

- ‘**Schedule H drug-Warning:** To be sold by retail on the prescription of a Registered Medical Practitioner only’.
- In order to have separate regulation to check unauthorized sale of antibiotics, a separate schedule as Schedule H1 introduced under the Drugs and Cosmetics Rules to regulate sale of antibiotics exclusively.
  - Corresponding provisions under the Rules could be framed for their implementation. *A system of colour coding of **3rd Generation antibiotics and all newer molecules like Carbapenem(Ertapenem, Imipenem, Meropenem), Tigecycline, Daptomycine** may be put in place restricting their access to only tertiary hospitals.*

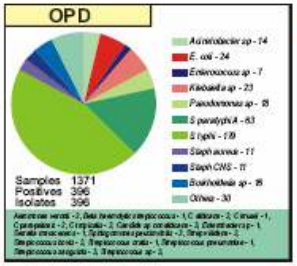
www.nicd.nic.in/ncdc/new-ab_policy.pdf.url

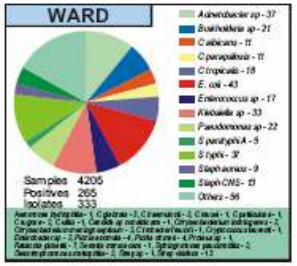
2: Hospital based sentinel National Surveillance System to Monitor antibiotic resistance

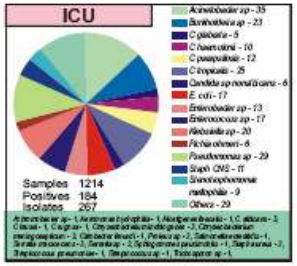
- Identification of pathogens/diseases of public health importance
- Creation of network of Antibiotic Susceptibility Testing (AST)
- Standardizing methodology for microbial identification and AST
- The laboratories to perform AST using standardized methods and carbapenem resistance isolates will be stocked and sent to designated central laboratory for further analysis likes identification of NDM 1 isolates.
- Strengthen Quality Systems in the network laboratories

www.nicd.nic.in/ncdc/new-ab_policy.pdf.url

BLOOD July - December 2006*







Percentage Resistance

OPD
WARD
ICU

GPC

	No. of Isolates	Penicillin	Oxacillin*	Amplicillin	Clindamycin	Gentamicin	HLAR* Gentamicin	Vancomycin
Staph aureus	11	92	25	-	0	40	-	0
	9	100	33	-	25	22	-	0
	2	-	-	-	-	-	-	-
Staph CNS	11	78	44	-	56	44	-	0
	13	100	60	-	60	75	-	0
	11	50	20	-	25	20	-	0
Enterococcus sp	7	-	-	43	-	-	57	0
	17	-	-	89	-	-	64	13#
	17	-	-	78	-	-	82	18##

* Two isolates of GRE (Glycopeptide Resistant Enterococci).
** Three isolates of GRE.
* HLAR: High Level Aminoglycoside Resistance.
** Oxacillin sensitivity can be extrapolated for all β-lactams and β-lactam-inhibitor combinations; and Vancomycin sensitivity for Teicoplanin.

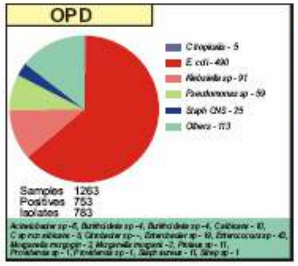
*OPD data for 1 year, (Jan to Dec 2006), included in this issue

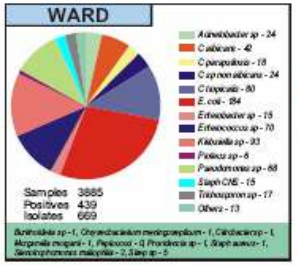
GNB

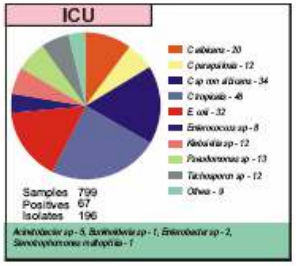
	No. of Isolates	Amplicillin	Cefotaxime	Ceftriaxone	Ceftazidime	Gentamicin	Amikacin	Nalidixic acid	Ciprofloxacin	Co-trimoxazole	Chloramphenicol	Piperacillin+ Tazobactum*	Cefoperazone+ Sulbactam*	Imipenem	Colistin
S. enterica serotype Typhi	179	14	-	0	-	-	-	86	6	23	14	-	-	-	-
	37	19	-	0	-	-	-	95	3	29	18	-	-	-	-
	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S. enterica serotype Paratyphi A	63	0	-	0	-	-	-	98	2	0	0	-	-	-	-
	5	0	-	0	-	-	-	100	0	0	0	-	-	-	-
	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E. coli	24	91	69	71	-	59	22	-	82	-	-	38	25	0	-
	43	93	94	87	-	61	14	-	88	-	-	16	29	0	-
	17	94	83	69	-	58	18	-	80	-	-	17	43	0	-
Klebsiella sp	23	100	87	85	-	75	70	-	89	-	-	79	87	0	-
	33	100	83	90	-	83	39	-	63	-	-	45	46	3**	-
	20	100	100	100	-	92	46	-	92	-	-	65	86	0	-
Pseudomonas sp	18	-	-	-	67	78	77	-	73	-	-	50	73	62	13
	22	-	-	-	67	58	60	-	43	-	-	23	53	33	13
	29	-	-	-	88	95	92	-	92	-	-	78	94	78	8
Acinetobacter sp	14	62	60	55	50	50	57	-	43	-	-	36	40	60	10
	37	85	-	100	100	74	60	-	70	-	-	64	65	57	0
	35	100	-	100	100	89	88	-	88	-	-	89	87	76	4
Burkholderia sp	16	-	-	-	23	-	-	-	-	27	-	-	-	50	-
	21	-	-	-	25	-	-	-	-	74	-	-	-	89	-
	23	-	-	-	25	-	-	-	-	14	-	-	-	94	-
Enterobacter sp	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13	100	100	78	-	80	64	-	80	-	-	70	67	0	-

*Percentage Resistance may indirectly appear higher than actual, because 2nd line drugs are tested only in multi-drug resistant isolates.
** One isolate.

URINE July - December 2006*







Percentage Resistance

OPD
WARD
ICU

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	No. of Isolates	Amplicillin	Penicillin	Oxacillin*	Clindamycin	Nitrofurantoin	Gentamicin	HLAR* Gentamicin	Norfloxacin	Vancomycin
Enterococcus sp	43	19	-	-	-	10	-	50	74	5#
	70	60	-	-	-	21	-	65	91	9##
	8	50	-	-	-	25	-	50	100	0
Staph CNS	25	-	87	54	29	0	59	50	69	0
	15	-	100	80	29	0	100	0	100	0
	0	-	-	-	-	-	-	-	-	-
Staph aureus	11	-	70	18	11	0	27	-	50	0
	1	-	-	-	-	-	-	-	-	-
	0	-	-	-	-	-	-	-	-	-

* Two isolates of GRE (Glycopeptide Resistant Enterococci).
** Six isolates of GRE.
* HLAR: High Level Aminoglycoside Resistance.
** Oxacillin sensitivity can be extrapolated for all β-lactams and β-lactam-inhibitor combinations; and Vancomycin sensitivity for Teicoplanin.

*OPD data for 1 year, (Jan to Dec 2006), included in this issue

GNB

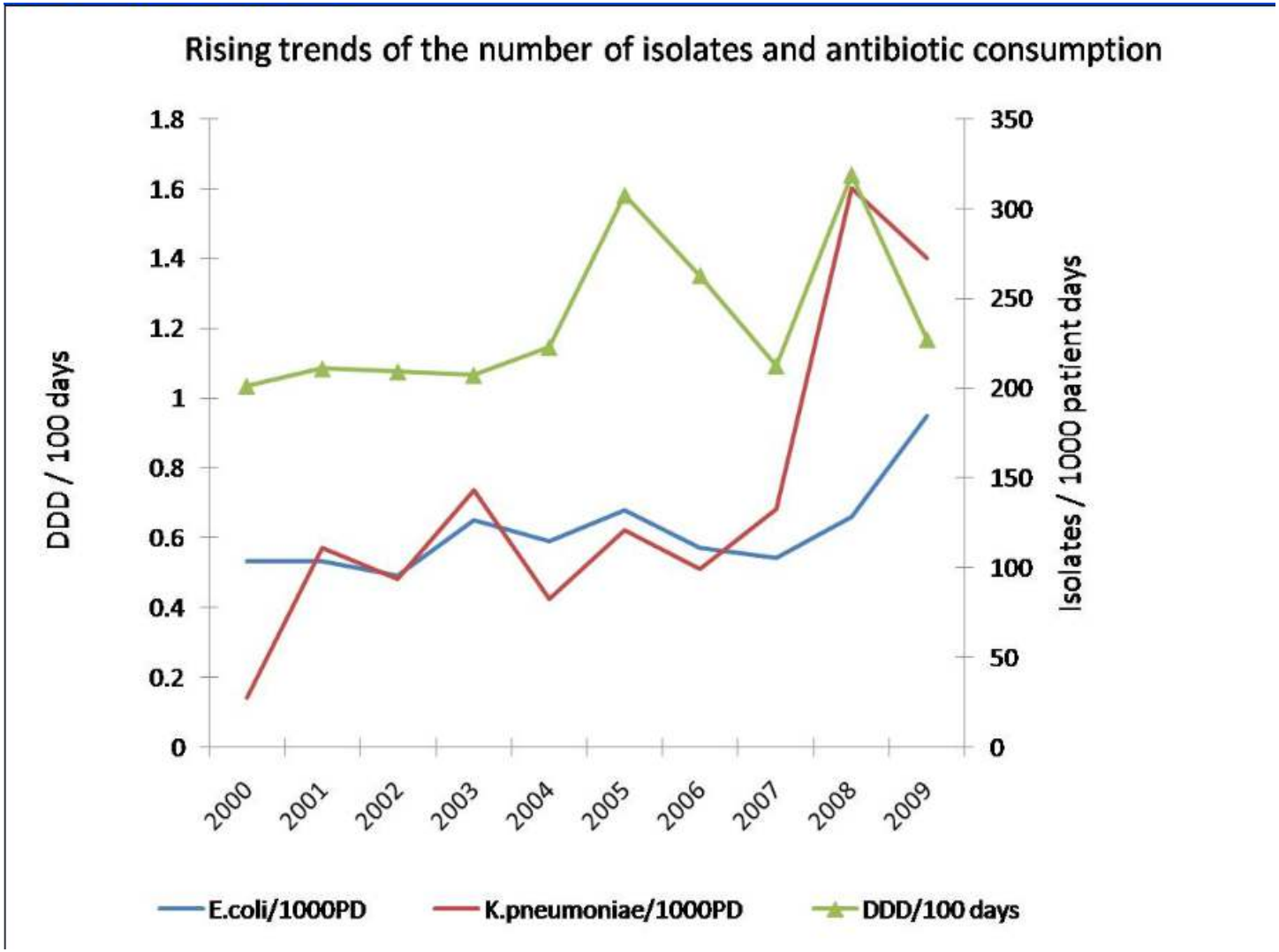
	No of Isolates	Amplicillin	Cefotaxime	Ceftazidime*	Nalidixic acid	Norfloxacin	Ciprofloxacin	Ofloxacin	Gentamicin	Netilmicin	Amikacin	Piperacillin+ Tazobactum*	Cefoperazone+ Sulbactam*	Imipenem	Co-trimoxazole	Nitrofurantoin
E. coli	490	89	65	64	94	82	80	78	59	47	33	38	36	0	76	25
	184	93	76	64	93	89	90	87	67	50	29	44	47	0	78	18
	32	100	87	67	96	89	89	86	75	50	30	50	63	0	81	16
Pseudomonas sp	59	100	83	40	100	100	78	49	75	61	67	25	45	30	100	92
	68	100	83	84	100	100	90	79	89	84	86	54	83	89	89	92
	13	100	75	67	100	0	78	67	67	63	67	42	44	83	100	100
Klebsiella sp	91	97	67	53	81	80	79	67	63	56	49	55	58	0	73	69
	93	100	83	89	86	74	75	80	68	63	64	68	70	0	75	65
	12	100	73	100	70	70	73	67	67	60	42	64	75	0	67	58
Enterobacter	19	94	56	50	86	75	71	50	61	89	57	56	53	0	78	63
	15	100	71	100	81	73	75	60	65	69	56	53	56	0	82	59
	2	100	50	-	50	50	50	-	50	50	50	50	50	0	50	100
Acinetobacter sp	6	50	50	50	25	25	57	100	29	50	43	29	33	50	40	50
	24	100	60	50	58	50	50	33	74	50	68	43	50	60	73	90
	5	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Proteus sp	11	64	13	0	73	33	20	25	9	9	10	0	0	0	64	73
	6	60	40	40	80	-	33	33	33	50	33	67	0	0	-	60
	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Percentage Resistance may indirectly appear higher than actual, because 2nd line drugs are tested only in multi-drug resistant isolates.

3: For Studying the documenting prescription patterns and establishing a monitoring system

- To study the consumption of various antibiotics in tertiary care public hospitals in Delhi under central government and then the rest of the country
- To study the trends in antibiotic use in these hospitals of Delhi
- Data generated will be used for intervention studies for rational use of antibiotics.

www.nicd.nic.in/ncdc/new-ab_policy.pdf.url



Ten years trends at SGRH (2000-2009)

Journal of Hospital Infection (xxxx) xx, 1–3

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SHORT REPORT

Prescription auditing and antimicrobial resistance at a tertiary care hospital in New Delhi, India

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KEYWORDS
Antibiotic use;
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Summary This paper reports the antibiotic consumption data of Sir Ganga Ram Hospital, New Delhi and bacterial resistance over a seven-year period. Cephalosporins, penicillins and fluoroquinolones were the most widely prescribed antibiotics. A correlation was seen between *Escherichia coli* resistance to third-generation cephalosporins and increased cephalosporin use, as well as resistance to coamoxyclav and its use.

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Trend analysis of antimicrobial consumption and development of resistance in non-fermenters in a tertiary care hospital in Delhi, India

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Objectives: Multidrug-resistant *Pseudomonas aeruginosa* and *Acinetobacter baumannii* are becoming increasingly important nosocomial pathogens worldwide. To study the evolution of non-fermenters in a tertiary care hospital, we undertook a retrospective 10 year (1999–2008) trend analysis of antimicrobial consumption and resistance in non-fermenters causing bacteraemia.

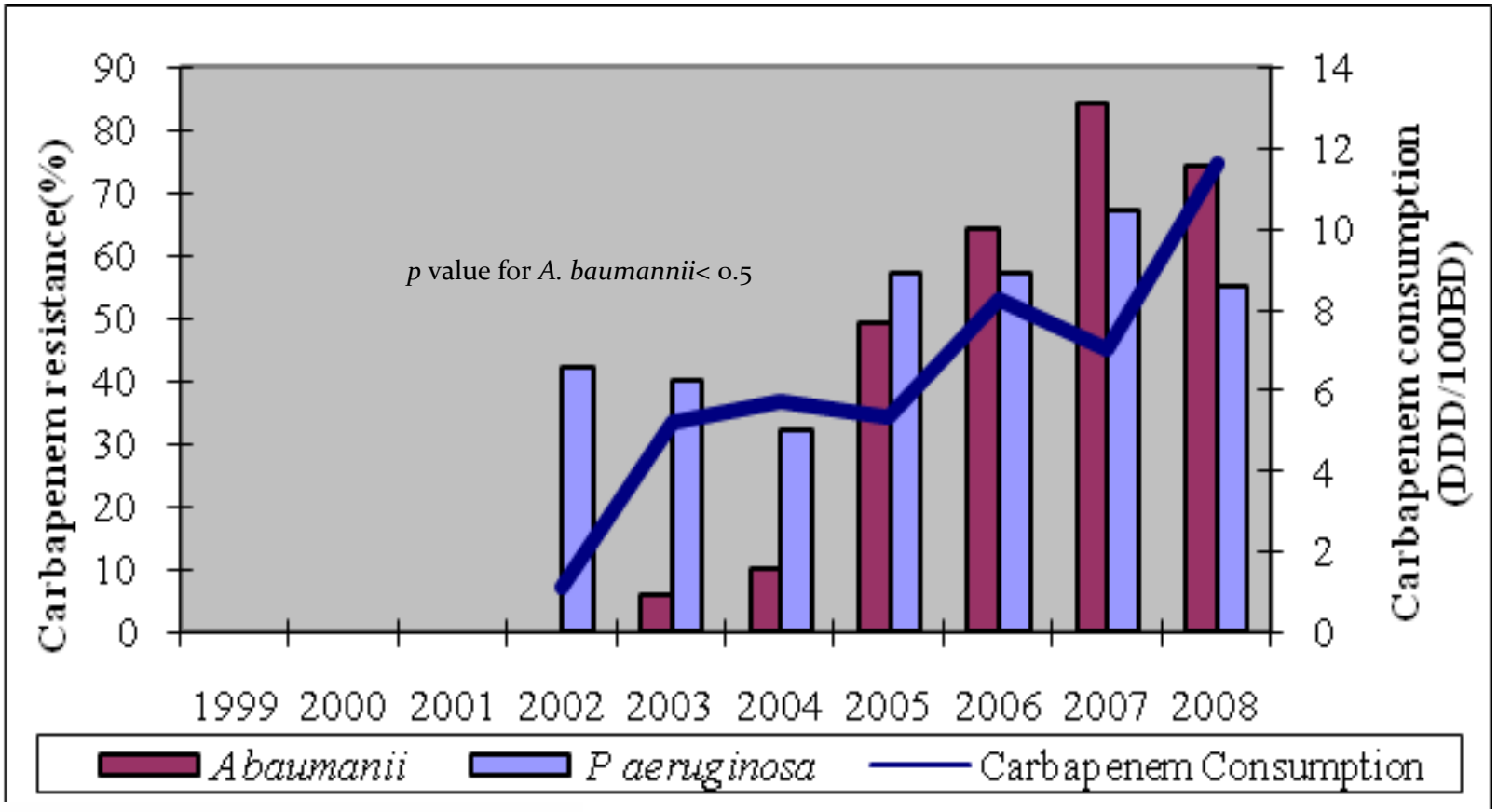
Methods: Antibiotic consumption and resistance were analysed by linear regression. The Pearson correlation coefficient was used for assessing correlation between them.

Results: A total of 69010 blood cultures were performed, which grew 15465 isolates (22% positivity rate), of which 1525 isolates (771 isolates of *P. aeruginosa* and 754 isolates of *A. baumannii*) were non-fermenters. Overall antibiotic consumption showed an increasing trend, from 158 to 319 defined daily doses (DDDs)/100 bed-days ($r^2=0.62$, $P=0.007$). The largest relative increase in antibiotic consumption was seen for carbapenems ($r^2=0.68$, $P=0.022$), followed by β-lactam/inhibitor combinations ($r^2=0.45$, $P=0.033$), whereas third-generation cephalosporins, fluoroquinolones and aminoglycosides showed no significant changes. A significant increase in resistance in *A. baumannii* to fluoroquinolones ($r^2=0.63$, $P=0.006$), aminoglycosides ($r^2=0.63$, $P=0.011$) and carbapenems ($r^2=0.82$, $P=0.013$) and in *P. aeruginosa* to aminoglycosides ($r^2=0.59$, $P=0.01$) was observed. Carbapenem consumption was associated with the development of resistance in *A. baumannii* ($r=0.756$, $P=0.049$), whereas no such association was observed for other antimicrobials among non-fermenters.

Conclusions: Our study highlights the growing problem of high antimicrobial consumption. The increasing prevalence of non-fermenters and the emergence of multidrug-resistant *A. baumannii* are associated with the consumption of carbapenems. The data cannot prove cause and effect.

Keywords: *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, carbapenems, DDDs/100 bed-days, bacteraemia

Association between carbapenem consumption and resistance in *P.aeruginosa* and *A. baumannii* (SGRH)



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4: For enforcement and enhancement of regulatory provisions for use of antibiotics in human, veterinary and industrial use.

- In India, the antibiotics are used widely in food animals as growth promoters and to prevent and treat infection. Non-therapeutic usage of antibiotics has been especially common in poultry production. However, there is no regulatory provision regarding the use of antibiotics in livestock.
- Establish intersectoral coordination committee with experts from various sectors.
- Develop regulations on usage of antimicrobials in poultry and other animals as well as the requisite labeling requirements in food.

www.nicd.nic.in/ncdc/new-ab_policy.pdf.url

5: For rationale use of drugs various strategies in hospitals which can be implemented

- Educational strategy: Training, printing materials, media-based approach
- Managerial strategy: Monitoring & supervision, generic substitution, patient cost sharing (economic incentives) etc
- Regulatory strategy: Enforcement, sanction, drug withdrawal, market control etc
- **Formulation ,implementation & monitoring of the antibiotic policy**
- With quality assured laboratory data in real time develop antibiotic policies that are standard national/local treatment guidelines advocating evidence based immunotherapy or combination therapy. This must include consideration of spectrum of antibiotics, Pharmacokinetics/ Pharmacodynamics, Adverse effects monitoring , Cost and special needs of individual patient groups

www.nicd.nic.in/ncdc/new-ab_policy.pdf.url

Blood Stream Infections (BSIs) Antibiotic Protocol: ICU *(valid upto* July 2011

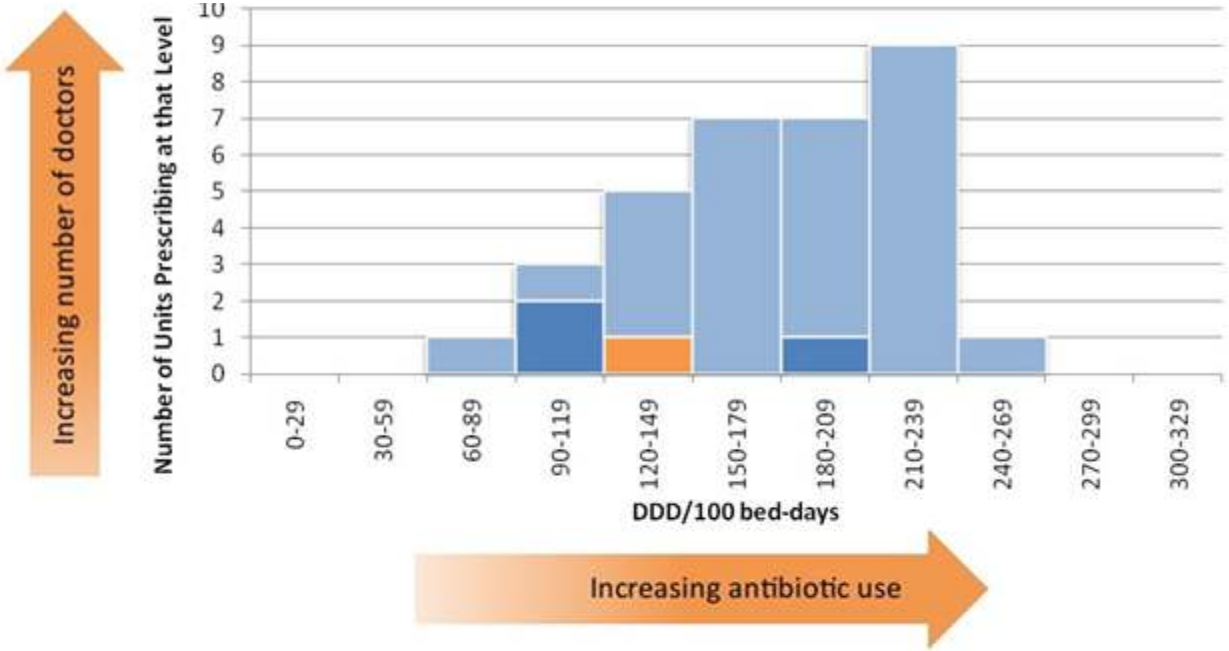
ICU MICROBIOLOGY DATA *(Total no. of isolates = 171)*

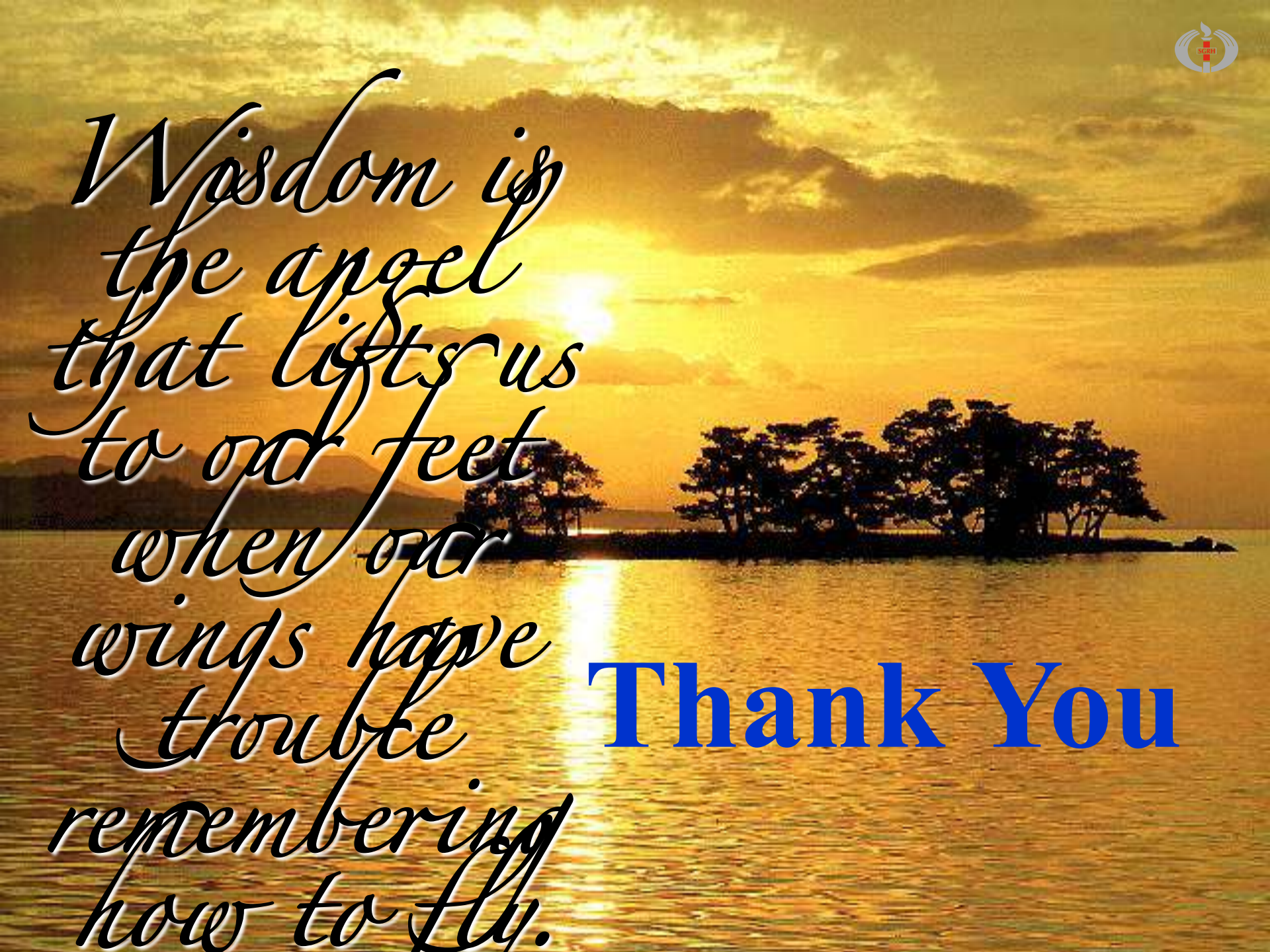
Most Common Pathogens	%	Antibiotics Susceptibility	%
Acinetobacter (n=48)	*28%*	*Colistin / Imipenem (=Amikacin) / Cef/Sul / Piptazo*	*98%; 9%; 6%; 2%*
Klebsiella (n=43)	*25%*	*Imipenem (~Ertapenem) / Amikacin / Piptazo / Cef/Sul*	*97%; 43%; 33%; 21%*
E.coli (n=24)	*14%*	*Imipenem (~Ertapenem) / Amikacin / Piptazo (=Cef/Sul)*	*100%; 92%; 67%*
Pseudomonas (n=20)	*12%*	*Colistin / Pip/Taz / Imipenem / Cef/Sul (=Amikacin)*	*91%; 62%; 29%; 27%*
Staph CNS(n=16)	*9%*	*Vancomycin (~Teicoplanin)*	*100%*

Patient Type 1 (CAI)	Patient Type 2 (HAI)	Patient Type 3 (NI)
No contact with health care system	*Contact with health care system (e.g. recent hospital admission, nursing home, dialysis) without invasive procedure*	*Long hospitalization and or invasive procedures*
No prior antibiotic treatment	*Recent antibiotic therapy*	*Recent & multiple antibiotic therapies*
Patient young with few co-morbid conditions	*Patient old with multiple co-morbidities.*	*Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.*
Send Sample for Culture	***Send Sample for Culture***	***Send Sample for Culture***
PRESUMPTIVE THERAPY	**PRESUMPTIVE THERAPY**	**PRESUMPTIVE THERAPY**
Ampicillin/ Ampicillin-sulbactam/ Amoxi-Clavulanate Ceftriaxone Ciprofloxacin*	Ertapenem/Tigecycline** ± Vancomycin/ Teicoplanin	Colistin+Imipenem+Sulbactam ± Vancomycin or teicoplanin
After Culture Report	***After Culture Report***	***After Culture Report***
Continue Treatment	***Continue Treatment***	***Continue Treatment***
S.typhi: Continue the treatment	ESBL +ve Klebsiella / E.coli: Continue treatment with monotherapy	Susceptible PA/AB /MRSA: Continue treatment as monotherapy
Stop "De-Escalate "	***Stop "De-Escalate "***	***Stop "De-Escalate "***
Continue monotherapy	Non ESBL Enterobacteriaceae, De-Escalate & Treat it as patients type 1	ESBL Positive Enterobacteriaceae, De-Escalate and treat as Patients Type 2
Consider Escalation	***Consider Escalation***	***Consider Escalation***
ESBL +ve Enterobacteriaceae including Salmonella: Escalate and treat as patient type 2	PA/AB: Escalate and treat as Patient Type 3; in case of MRSA add Vancomycin or Teicoplanin	MDR-PA or AB: Continue 3 Drug Colistin + Imipenem + Sulbactam

*Avoid Ciprofloxacin since it has potent antipseudomonal activity

Case Mix Based Antibiotic Consumption Monitoring




Wisdom is
the angel
that lifts us
to our feet
when our
wings have
trouble
remembering
how to fly.
Thank You