



Microbiology Newsletter

Sir Ganga Ram Hospital

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Mixed infection following Liver transplantation

CASE

A 44 years male, diagnosed case of HCV related liver disease for last 2 years with suspected hepatocellular carcinoma, was admitted at Sir Ganga Ram hospital for liver transplant in 2009. Post transplant course in hospital was uneventful & patient was advised prednisolone, mycophenolate mofetil, amoxicillin - clavulanate & co-trimoxazole on discharge.

Four months post transplant he suffered from a rejection episode for which high dose prednisolone was given. His condition improved and steroids were being tapered. But he developed low grade fever, cough, & expectoration. On admission his temperature was 38°C; pulse 100/min; BP 120/90 mmHg and respiratory rate 40/min. Pallor, icterus & pedal edemas were present. Chest auscultation revealed bilateral coarse crepitations in both lung fields. Chest radiograph showed multiple well defined opacities in bilateral lung fields (Fig 1). CT thorax revealed areas of consolidation in right lower lobe, multiple cavitory lesions and subcentimeter nodular lesion bilaterally. Bronchoscopy was performed and urine, blood, sputum & BAL samples were sent for laboratory investigations. Empirical treatment with intravenous cefprozalone - sulbactam and oral linezolid was started.

Laboratory studies revealed: TLC count 13,400 cells/mm³, with absolute polymorphonuclear leukocytosis, haemoglobin 11.2 g/dl, and platelet count 2,50,000 cells/ul. Blood sugar was raised and HbA1c was 12. Urine and blood cultures were negative. KOH of sputum & BAL revealed few septate branching fungal hyphae and Gram's stain of sputum and BAL samples numerous gram positive, beaded and thin filamentous bacteria with branching at right angles suggestive of *Nocardia spp.*¹ and Modified ZN stain (1% H₂SO₄) showed acid fast branching filamentous organisms. (Fig. 2) Samples were cultured on blood agar (BA), MacConkey's (MAC) agar, Sabourauds dextrose agar (SDA) & Buffered charcoal yeast agar (BCYE) and selective BYCE. After 48 hours of incubation rough whitish-yellow dry colonies were seen on BA & BCYE,

which was identified as *Nocardia spp.* On disk diffusion test the isolate was sensitive to amikacin, gentamicin, chloramphenicol, erythromycin, ciprofloxacin, ceftriaxone and co-trimoxazole. Sabourauds Agar grew a filamentous fungus which was identified as *Aspergillus flavus*. Serum Galactomannan antigen test was positive with an index value of 5.02.

Patient was treated with mphotericin B, voriconazole & co-trimoxazole. His chest lesions started resolving and repeat galactomannan index values decreased to 2.40 & 2.80 on subsequent occasions. But his consciousness levels decreased. CT head showed a large hypodense lesion in right frontoparietal region involving right basal ganglia & perilesional oedema suggestive of disseminated fungal infection to brain. Patient was shifted to ICU and put on ventilatory support. He showed gradual deterioration with fall in platelets count & hemoglobin levels (treated with blood and platelet transfusions), increase in TLC and bilirubin levels, metabolic acidosis and renal failure. Despite all efforts, patient succumbed to cardiac arrest 5½ months post transplantation.

DISCUSSION

We present a case of cavitory lung lesions coinfectd with *Aspergillus flavus* and *Nocardia spp.* Nocardiosis is usually an opportunistic infection and commonly present as pulmonary disease. Arguably, the most common condition predisposing the patient to nocardiosis is underlying chronic lung disease, often in association with long-term corticosteroid therapy. Other predisposing conditions include diabetes mellitus, haematologic and other malignancies, transplantation and AIDS.¹

Estimated 500-1000 new cases of nocardial infections occur every year in the United States. However, in India the reports are scanty possibly as a result of underreporting and lack of awareness. In India, an incidence of 1.37% among post renal transplant patient in South India has been reported². The overall incidence of nocardiosis among renal transplant recipients varies from 2 to 20%³ and the mortality may be as high as 77%⁴. Exact incidence in liver transplant patients has not been evaluated until now.

Fig. 1

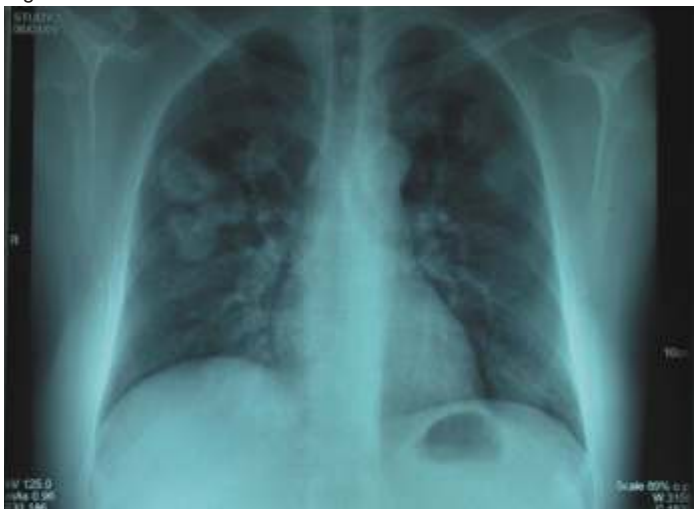
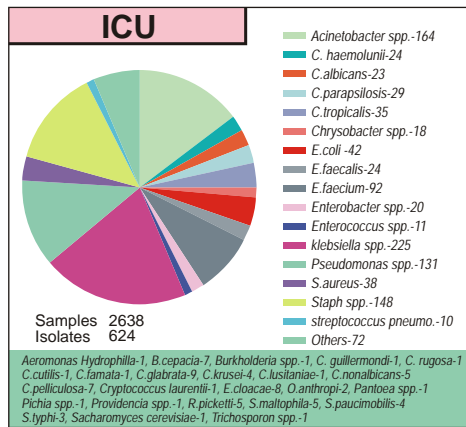
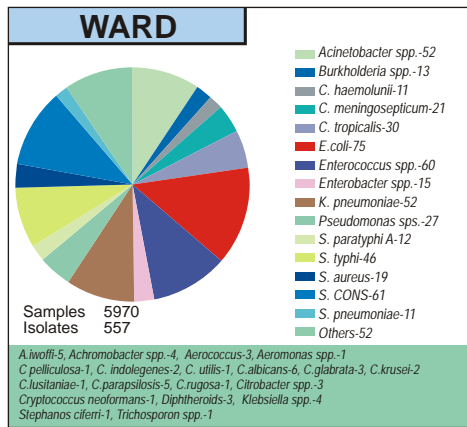
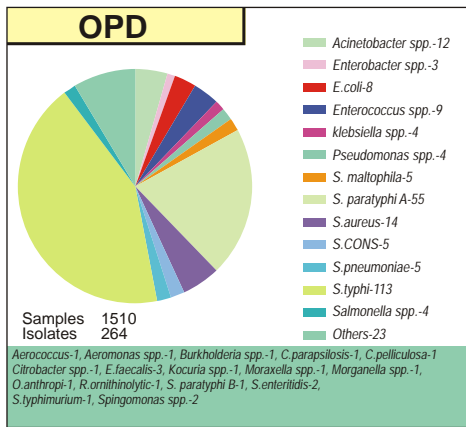


Fig. 2 (40X)



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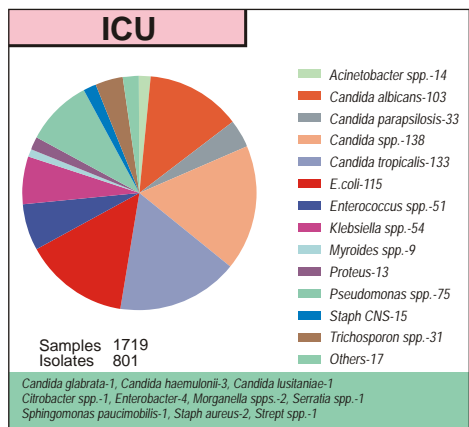
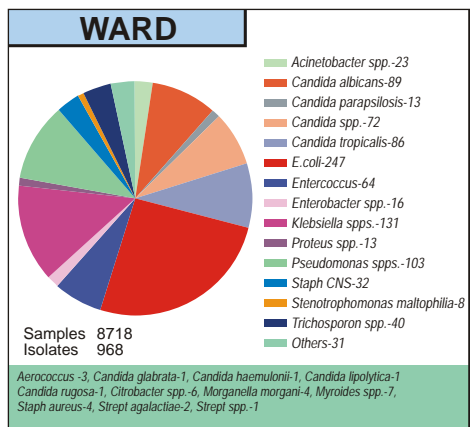
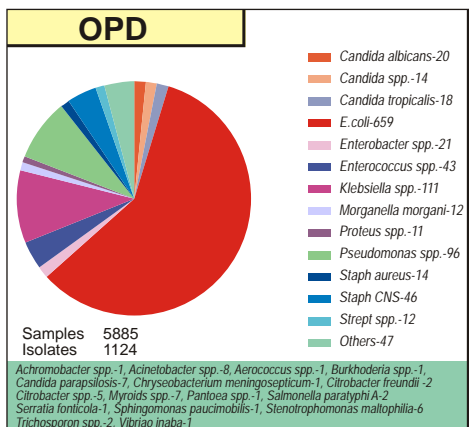
PERCENTAGE SENSITIVITY

GPC	No. of Isolates	Antibiotic										
		Penicillin	Ampicillin	Oxacillin	Ceftriaxone	Clindamycin	Levofloxacin	Gentamicin	Gentamicin 120	Vancomycin / Teicoplanin	Linezolid	Tigecycline
Staph aureus	14	7	-	100	-	78	-	100	-	100	100	100
	19	0	-	65	-	74	-	57	-	100	100	100
	38	0	-	57	-	50	-	44	-	100	100	100
Staph CNS	5	-	-	-	-	-	-	-	-	-	-	-
	61	0	-	5	-	21	-	34	-	100	100	-
	148	0	-	0	-	10	-	21	-	100	100	-
Enterococcus spp.	9	-	55	-	-	-	-	-	35	100	100	-
	60	-	47	-	-	-	-	-	25	90*	100	-
	127	-	42	-	-	-	-	-	16	90**	100	-
Strep. pneumoniae	5	100	-	100	100	-	100	-	-	100	100	-
	11	100	-	100	100	-	100	-	-	100	100	-
	10	80***	-	100	100	-	100	-	-	100	100	-

* 6 VRE **13 VRE (All VRE were E. faecium)
 *** 2 isolates were MS to penicillin (MIC- 0.25-1mg/l), - Not Done

GNB	No of isolates	Antibiotic																		
		Ampicillin	Ceftriaxone	Cefexime	Ceftazidime	Cefepime	Gentamicin	Amikacin	Nalidixic Acid	Ciprofloxacin	Levofloxacin	Co-trimoxazole	Chloramphenicol	Aztreonam	^Piperacillin + Tazobactam	^Cefoperazone + Sulbactam	Ertapenem	Imipenem / Meropenem	Tigecycline	Colistin
S.typhi	113	92	100	100	-	-	-	7	77	-	86	90	-	-	-	-	-	-	-	-
	46	88	100	100	-	-	-	8	81	-	72	87	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-	-	-
S.paratyphi A	55	96	100	100	-	-	-	0	100	-	98	100	-	-	-	-	-	-	-	-
	12	100	100	100	-	-	-	8	100	-	100	100	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E. coli	8	12*	37	-	-	37	37*	87*	-	12	-	-	-	37	83	82	87*	100	100	-
	75	7	32	-	-	37	62	95	-	17	-	-	-	37	82	92	92	98	97	100*
	42	4	11	-	-	8	24	73	-	6	-	-	-	9	68	66	80	87	100	100
Klebsiella spp.	4	-	25*	-	-	20*	40*	50*	-	33*	-	-	-	20*	33*	50*	55*	60*	75*	-
	52	-	9	-	-	8	17	72	-	16	-	-	-	9	41	39	64	69	93	100
	225	-	4	-	-	5	11	42	-	8	-	-	-	4	18	22	39	49	80	100
Enterobacter spp.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15	-	33	-	-	33	38	85	-	13	-	-	-	45	68	63	80	95	-	100
	20	-	28	-	-	26	20	76	-	10	-	-	-	35	60	60	73	84	-	100
Pseudomonas spp.	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	27	-	-	-	58	59	33	38	-	30	-	-	-	15	68	54	-	61	-	92
	131	-	-	-	58	57	33	37	-	36	-	-	-	39	72	52	-	41	-	100
Acinetobacter spp.	12	54	75	-	67	75	75	75	-	54	-	100*	-	50	73	100	-	75	100	100
	52	4	20	-	37	44	52	52	-	39	-	100*	-	5	40	50	-	43	61	100
	164	1	0	-	8	2	14	24	-	11	-	12	-	2	11	28	-	20	30	100
Burkholderia spp.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
	13	-	-	-	100	-	-	-	-	-	-	90	84	-	-	-	-	8	-	-
	44	-	-	-	93	-	-	-	-	-	-	97	90	-	-	-	-	5	-	-

* < 5 isolates ESBL = 52.8% ^Therapy of ESBLs with these agents can result in treatment failures
 ACCo in S. typhi: 14% Carbapenemase production - 17% - Not Done



PERCENTAGE SENSITIVITY

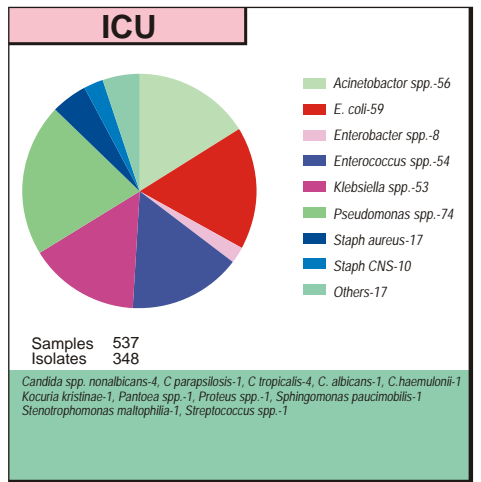
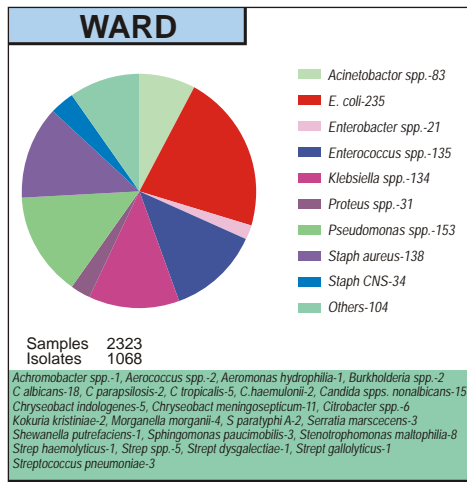
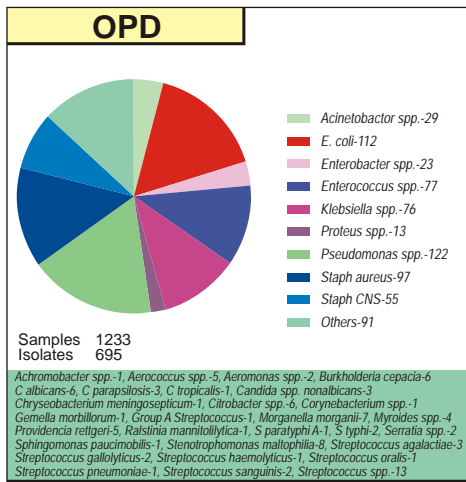
OPD
WARD
ICU

GPC	No. of Isolates	Antibiotics								
		Penicillin	Ampicillin	Oxacillin	Clindamycin	Gentamicin	Norfloxacin	Nitrofurantoin	Vancomycin / Teicoplanin	Linezolid
Staph aureus	14	6		93	85	53	42	100	100	-
	4	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-
Staph CNS	46	0	-	30	74	60	-	100	100	-
	32	0	-	19	58	57	-	100	100	-
	15	10	-	24	61	60	-	100	100	-
Enterococcus spp.	43	-	77	-	-	-	20	82	98	100
	64	-	33	-	-	-	13	57	80	100
	51	-	21	-	-	-	12	45	66	100

- Not Done

GNB	No of isolates	Antibiotics																
		Ampicillin	Cefuroxime	Cefotaxime	Ceftazidime	Cefepime	Gentamicin	Netilmicin	Amikacin	Aztreonam	Nitrofurantoin	Norfloxacin	Co-trimoxazole	^Cefoperazone+ Sulbactam	^Piperacillin+ Tazobactam	Ertapenem	Imipenem / Meropenem	Colistin
E. coli	659	11	28	34	-	34	46	87	92	37	86	19	25	94	88	94	98	92
	247	8	17	21	-	20	40	81	85	20	85	10	20	90	80	79	84	95
	115	3	14	13	-	12	32	80	83	13	82	16	15	86	81	82	96	100
Klebsiella spp.	111	0	19	17	-	52	39	75	74	20	40	34	25	77	67	70	97	100
	131	0	13	10	-	20	34	62	74	16	21	25	20	53	36	73	65	100
	54	0	5	5	-	5	32	62	57	5	46	26	15	58	40	35	56	88
Enterobacter spp.	21	0	40	83	-	67	34	60	50	42	54	46	42	83	77	62	77	100
	16	0	37	54	-	42	33	58	57	13	37	22	22	54	44	26	62	100
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Proteus spp.	11	27	45	42	-	100	67	68	92	91	-	55	41	96	93	-	90	-
	13	21	57	63	-	63	70	61	78	68	-	45	40	85	90	100	90	-
	13	83	76	81	-	50	60	56	71	60	-	38	35	76	81	-	86	-
Pseudomonas spp.	96	-	-	-	31	37	30	34	32	43	-	30	-	41	60	-	35	100
	103	-	-	-	32	32	25	34	29	29	-	25	-	39	52	-	38	100
	75	-	-	-	11	28	14	21	20	35	-	14	-	31	34	-	24	100
Acinetobacter spp.	8**	-	-	20*	33	25	20	100	33	25	-	0*	14	72	25*	-	37	100
	23***	-	-	29	36	23	13	33	28	10	-	30	13	52	43	-	17	100
	14***	-	-	18	40	33	23	50	28	11	-	16	25	30	28	-	33	100

* < 5 isolates
 ** All A. lwoffii
 *** Mostly A. baumannii
 ^Therapy of ESBLs with these agents can result in treatment failures
 - Not Done



PERCENTAGE SENSITIVITY

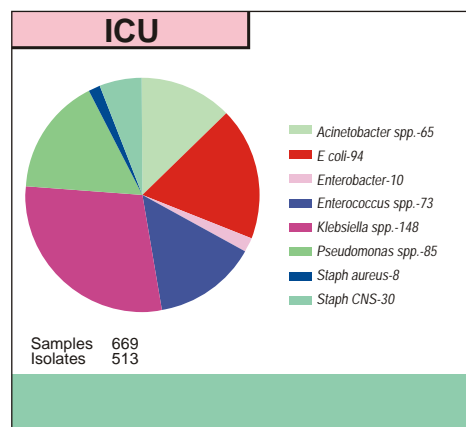
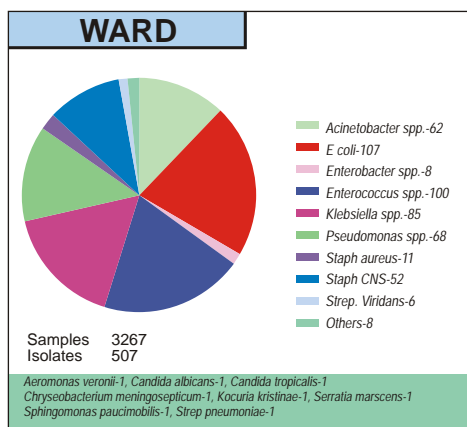
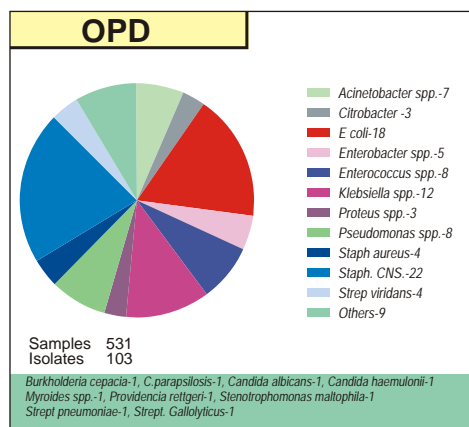
GPC	No. of Isolates	Antibiotic									
		Penicillin	Ampicillin	Oxacillin	Erythromycin	Clindamycin	Gentamicin	HLAR Gentamicin	Vancomycin / Teicoplanin	Linezolid	Tigecycline
<i>Staph aureus</i>	97	8	-	73	57	78	84	-	100	-	100
	138	7	-	72	50	78	73	-	100	-	100
	17	12	-	77	38	76	80	-	100	-	100
<i>Enterococcus spp.</i>	77	-	79	-	-	-	-	47	95	100	100
	135	-	59	-	-	-	-	36	90	100	100
	54	-	26	-	-	-	-	20	84	100	100
<i>Staph CNS</i>	55	4	-	29	25	51	56	-	100	-	-
	34	6	-	33	43	68	47	-	100	-	-
	10	0	-	0	0	13	38	-	100	-	-

OPD
WARD
ICU

Daptomycin MIC testing for MRSA in pus started in 2009
- Not Done

GNB	No of isolates	Antibiotic															
		Ampicillin	Cefturoxime	Ceftriaxone	Ceftazidime	Cefepime	Ciprofloxacin	Gentamicin	Netilmicin	Amikacin	Aztreonam	^Piperacillin + Tazobactam	^Cefoperazone+ Sulbactam	Ertapenem	Imipenem / Meropenem	Tigecycline	Colistin
<i>E. coli</i>	112	6	24	24	-	24	16	41	86	87	23	89	94	91	96	100	100
	235	5	15	17	-	19	9	42	83	86	17	75	90	90	95	100	100
	59	7	11	11	-	17	8	37	77	78	13	64	78	74	93	92	95
<i>Klebsiella spp.</i>	76	-	33	34	-	34	37	43	61	66	34	63	70	62	89	100	100
	134	-	15	12	-	30	21	33	52	64	13	47	52	54	78	96	100
	53	-	12	12	-	10	15	31	46	50	8	28	39	22	66	78	97
<i>Enterobacter spp.</i>	23	0	25	27	-	57	62	37	71	85	47	79	90	83	96	100	100
	21	6	62	50	-	42	29	38	86	43	38	55	71	78	70	100	100
	8	0	17	13	-	29	14	14	33	25	14	50	50	-	71	100	100
<i>Proteus spp.</i>	13	8	42	54	-	75	82	60	73	83	75	92	92	-	92	-	-
	31	19	46	56	-	70	62	63	52	82	67	100	94	-	91	100	-
	14	43	67	54	-	38	54	54	55	57	64	93	80	-	93	-	100
<i>Pseudomonas spp.</i>	122	-	-	-	62	52	48	49	55	57	61	59	56	-	66	-	100
	153	-	-	-	45	44	35	37	42	42	36	56	45	-	56	-	100
	74	-	-	-	28	22	32	18	21	23	25	26	22	-	30	-	97
<i>Acinetobacter spp.</i>	29	-	-	5	9	18	18	15	69	21	55	17	41	-	21	29	100
	83	-	-	5	7	8	9	15	46	13	43	10	40	-	21	31	100
	56	-	-	2	2	4	4	6	44	7	75	4	21	-	7	37	100

^Therapy of ESBLs with these agents can result in treatment failures
- Not Done



PERCENTAGE SENSITIVITY

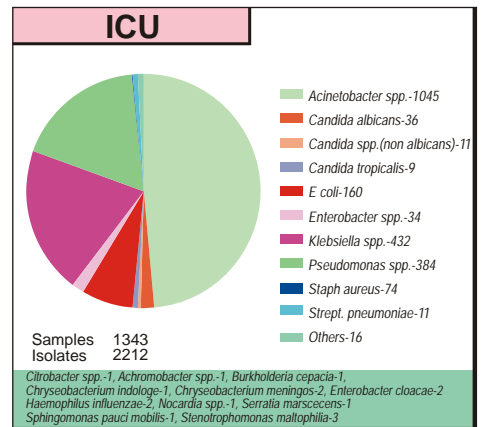
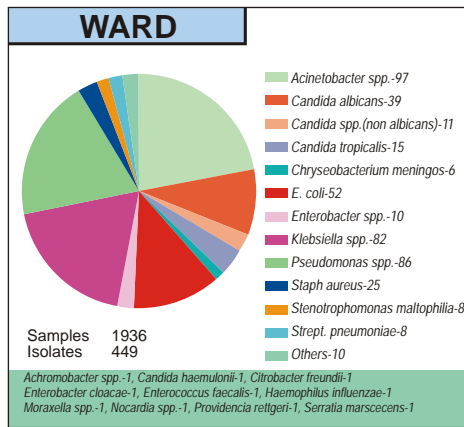
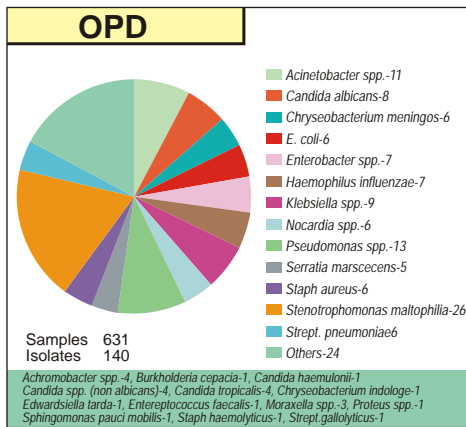
GPC	No. of Isolates	Penicillin	Ampicillin	Oxacillin	Erythromycin	Clindamycin	Gentamicin	Gentamicin HLAR	Vancomycin / Telcoplanin	Linezolid	Tigecycline
		OPD	WARD	ICU	OPD	WARD	ICU	OPD	WARD	ICU	OPD
<i>Staph aureus</i>	4	0	-	75	50	100	75	-	100	-	-
	11	0	-	63	40	45	55	-	100	-	100
	8	13	-	50	67	75	67	-	100	-	100
<i>Staph CNS</i>	22	5	-	36	24	57	76	-	100	-	-
	52	0	-	12	38	55	35	-	100	-	-
	30	0	-	10	24	35	43	-	100	-	-
<i>Enterococcus spp.</i>	8	-	36	-	-	-	-	33	83	100	100
	100	-	21	-	-	-	-	17	63	100	100
	73	-	21	-	-	-	-	22	75	100	100

- Not Done

GNB	No of isolates	Ampicillin	Cefturoxim	Ceftriaxone	Ceftazidime	Cefpime	Ciprofloxacin	Gentamicin	Netilmicin	Amikacin	Aztreonam	^Cefoperazone+ Sulbactam	^Piperacillin + Tazobactam	Ertapenem	Imipenem / Meropenem	Tigecycline	Colistin
		OPD	WARD	ICU	OPD	WARD	ICU	OPD	WARD	ICU	OPD	WARD	ICU	OPD	WARD	ICU	OPD
<i>E. coli</i>	18	12	50	44	-	41	22	27	67	88	41	100	75	83	100	100	100
	107	2	2	4	-	10	7	32	64	79	6	82	65	84	93	100	100
	94	1	3	6	-	5	3	35	64	76	6	68	51	79	88	100	85
<i>Klebsiella spp.</i>	12	0	0	38	-	36	40	44	50	78	36	75	75	75	92	100	100
	85	0	9	4	-	11	9	28	41	56	6	28	28	31	50	96	100
	148	0	3	0	-	1	3	4	20	60	0	16	9	21	34	90	98
<i>Enterobacter spp.</i>	5	0	33	33	-	40	75	50	67	100	60	100	75	100	100	100	-
	8	0	-	-	-	33	50	43	50	83	14	71	67	60	71	100	-
	10	0	20	25	-	56	57	44	50	75	29	88	71	80	100	100	-
<i>Pseudomonas spp.</i>	8	-	-	-	83	75	67	57	50	57	33	67	86	-	75	-	100
	68	-	-	-	18	30	2	20	27	25	11	30	41	-	31	-	100
	85	-	-	-	10	10	8	6	7	10	9	8	20	-	6	-	100
<i>Acinetobacter spp.</i>	7	-	-	-	60	71	83	71	-	83	60	83	83	-	86	67	100
	62	-	-	-	12	9	9	21	100	40	2	40	9	-	20	48	100
	65	-	-	-	4	8	15	10	25	9	4	28	15	-	22	19	98

^Therapy of ESBLs with these agents can result in treatment failures

- Not Done



PERCENTAGE SENSITIVITY

OPD
WARD
ICU

GPC

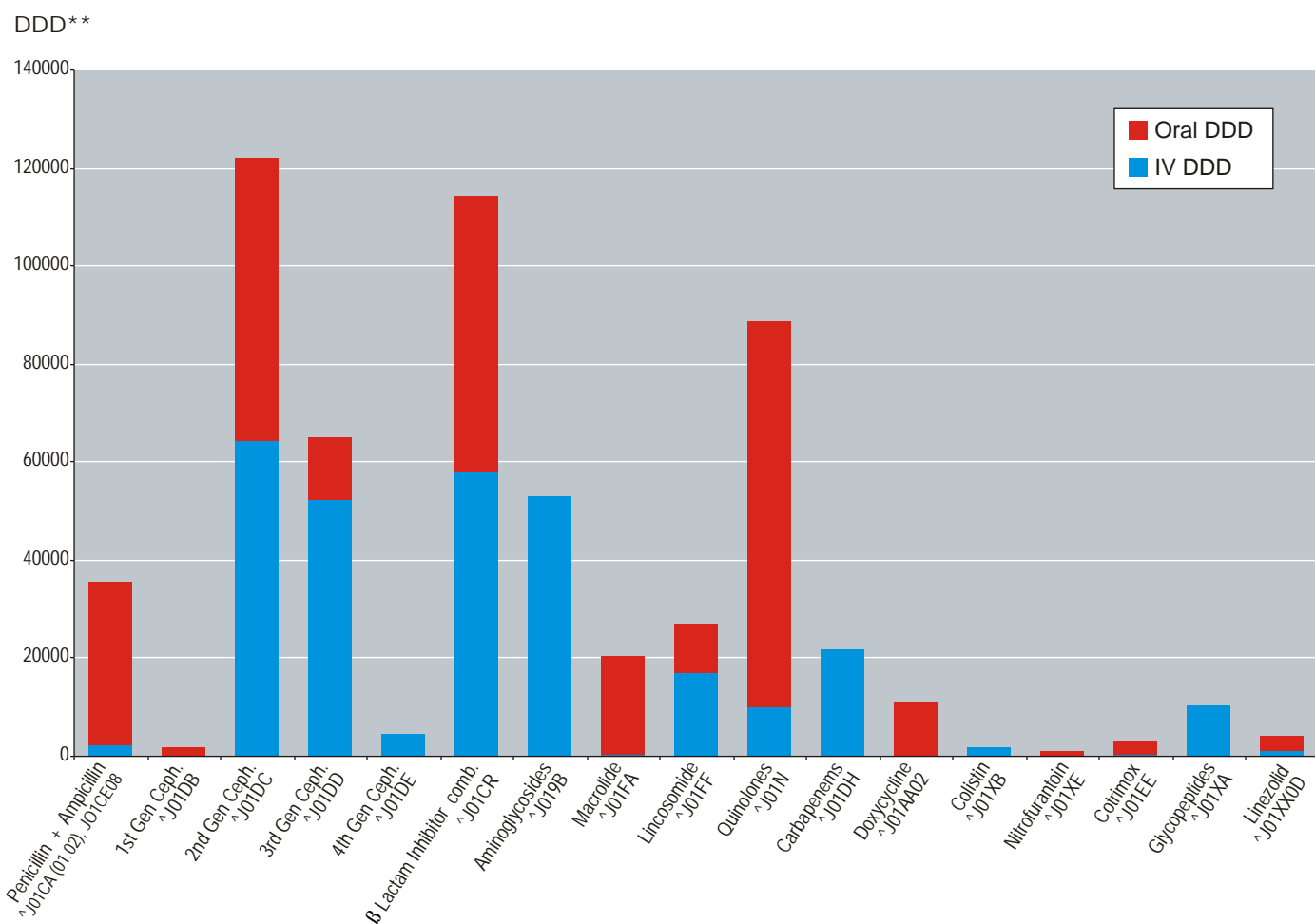
	No of isolates	Penicillin	Oxacillin	Clindamycin	Erythromycin	Gentamicin	Vancomycin / Teicoplanin	Tigecycline	Linezolid
<i>Staph aureus</i>	6	0	100	80	80	100	100	100	100
	25	12	47	36	24	38	100	100	100
	74	0	26	40	37	34	100	100	100
<i>Strept pneumoniae</i>	6	100	80	100	100	100	100	-	-
	8	100	100	60	75	100	100	-	-
	11	90*	100	75	-	100	100	-	-

* Only one isolate
- Not Done

GNB

	No of isolates	Ampicillin	Cefturoxime	Ceftriaxone	Ceftazidime	Cefpime	Gentamicin	Netilmicin	Amikacin	Ciprofloxacin	Co-trimoxazole	Co-amoxyclov	*Cefepazone+ Sulbactam	*Piperacillin + Tazobactam	Imipenem / Meropenem	Ertapenem	Tigecycline	Colistin
<i>E. coli</i>	6	0	0	50	-	14	33	-	83	20	40	-	83	83	100	100	100	100
	52	0	4	7	-	6	48	67	80	13	27	20	76	56	98	96	100	100
	160	2	5	12	-	10	34	66	74	10	26	7	70	63	93	87	100	100
<i>Klebsiella spp.</i>	9	0	20	50	-	38	67	64	78	71	50	50	100	85	89	100	100	-
	82	0	3	5	-	33	20	34	63	17	30	4	57	52	89	57	83	100
	432	0	5	4	-	24	26	22	55	15	24	5	33	22	71	61	72	97
<i>Enterobacter spp.</i>	7	0	-	-	-	67	100	100	100	67	50	50	100	100	100	-	100	-
	10	0	14	50	-	66	62	66	88	66	60	14	88	90	100	-	100	100
	34	0	15	66	-	29	26	54	38	46	48	33	32	36	76	37	100	100
<i>Pseudomonas spp.</i>	13	0	-	-	55	80	65	54	47	75	-	-	54	50	57	-	-	100
	86	0	-	0	44	40	34	36	37	38	0	-	39	46	40	-	-	91
	384	0	-	0	24	22	28	24	25	22	0	-	27	36	24	-	-	94
<i>Acinetobacter spp.</i>	11	0	-	0	11	2	30	30	13	13	14	-	25	17	11	-	-	100
	97	0	0	0	6	5	10	10	11	8	6	0	10	4	7	33	48	99
	1045	0	0	1	2	18	7	7	8	3	5	0	18	2	7	7	36	99

^Therapy of ESBLs with these agents can result in treatment failures
- Not Done



* Based on the hospital pharmacy data of the antibiotics purchased.

** DDD - Daily Defined Doses: Calculated as per the Anatomical Therapeutic Chemical (ATC) classification index, WHO Collaborating Centre for Drug Statistics Methodology, OSLO, Norway.

^ATC Codes.

RECENT PUBLICATIONS

1. Wattal C, Oberoi JK, Raveendran R and Prasad KJ. Current Status of Newer Anti-infectives. Recent Patents on Anti-Infective Drug Discovery. Bentham Science Publishers Ltd. 2008; 3(3): 206-24
2. Wattal C, Sharma A, Raveendran R, Bhandari SK, Khanna S. Community-Based Surveillance of Antimicrobial Use and Resistance in Resource Constrained Settings. Report on five pilot projects, World Health Organization. 2009; WHO/EMP/MAR/2009.2

WORKSHOPS HELD

One of the satellite pre-conference workshops of 1st Annual conference of IAMM-Delhi chapter was organized at SGRH on March 27, 2009 on the following topics:

1. Molecular Virology Diagnostics: "A New Frontier".
2. Automation in bacteriology: "A Paradigm Shift".

HIGHLIGHTS

- From 2008 onwards the susceptibility of isolates will be given as percentage sensitivity (as per CLSI M39-A2 guidelines, 2006) against percentage resistance, which was the practice in our previous issues.
- ACCo in Salmonella: 14%.
- ESBL (blood isolates): 52.8% (wards).
- Carbapenemase production (KPC by Modified Hodge Test and MBL by imipenem - imipenem / EDTA disc method) blood isolates: 17% (wards).
- VRE (blood isolates): 10% (wards).
- MRSA (blood isolates): 42% (wards).
- Penicillin resistant *Streptococcus pneumoniae* in blood: 8% (all MS to penicillin).
- Daptomycin susceptibility for gram positive cocci testing started by E-test.

Mixed infection following Liver transplantation (contd.)

Mortality in pulmonary nocardiosis in patients receiving immunosuppressive anti-neoplastic or corticosteroids therapy is 80-100% as compared to 15-20% in healthy persons with untreated underlying disease.^{5,6}

There have been only rare case reports of coexistence of aspergillosis and nocardiosis.^{7,8,9} The profound immunosuppression might have contributed to the development of this rare co-infection in this patient.

Most human infections are caused by *N. asteroides* sensu stricto type VI, *N. farcinica*, *N. nova*, *N. brasiliensis*, *N. otitiscavicularum* and possibly, *N. pseudobrasiliensis*. Majority of primary cases present as pulmonary disease, though local abscesses have been well described. Disseminated infections occur as bacteremia, empyema, brain abscess, pericarditis, synovitis, and soft tissue infection.¹⁰

Clinical diagnosis of nocardiosis based on signs, symptoms, and radiologic studies may suggest the diagnosis but is not pathognomonic. Gram staining is the most sensitive method by which to visualize and recognize nocardia in clinical specimens if the index of suspicion is high. The modified acidfast stain (Kinyoun stain) has been recommended only to confirm the acid fastness of organisms detected by Gram staining.¹⁰ Growth occurs on most routine bacteriologic media such as 5% sheep blood agar, chocolate agar and automated blood culture systems. Use of selective media as colistin-nalidixic acid agar, modified Thayer-Martin agar, and buffered charcoal-yeast extract (BCYE) and selective BCYE agars help in recovery of the organism from heavily contaminated specimens.¹ Although it has been isolated from cultures for mycobacteria, it has been observed that decontamination procedures used for mycobacteria may be deleterious to its growth.

Identification to the species level by biochemical tests is tedious and problematic. Molecular methods though successful in identifying the nocardia to the species level are rarely performed in routine laboratories.^{11,12}

Though disc agar diffusion, agar dilution, gradient strip agar dilution (E test), have been used for susceptibility testing, a standard for susceptibility testing by broth microdilution and with cation-supplemented Mueller-Hinton broth has been approved by the CLSI and should be done in refractory cases.¹³

Sulfa-containing antimicrobials remain the drugs of choice and may improve survival when used alone or in combination with other antimicrobials.¹⁴ Primary agents used successfully are minocycline, amikacin, imipenem and linezolid. For serious infections combination treatment with sulfa-containing agent and one of the primary agents or amikacin with imipenem has been suggested. Other efficacious choices include extended-spectrum cephalosporins, amoxicillin-clavulanate, newer macrolides, other aminoglycosides, and the fluoroquinolones.^{11,10}

CONCLUSION

With increasing cases of transplantation and use of immunosuppressants and corticosteroids the possibility of co-infection with rare organisms should be kept in mind. Because of the serious morbidity and mortality that can result from either Nocardia or Aspergillus infections, broad based clinical diagnosis and an aggressive work-up with high index of suspicion are necessary to identify the causative organisms and institute appropriate antimicrobial therapy.

DEPARTMENT NEWS

- Mini VIDAS upgraded to VIDAS to handle increased volumes.
- Manual extraction of nucleic acid is upgraded to semi-automated extraction by Mini-mag.
- HIV nucliscens upgraded to Real-time NASBA HIV platform by Easy Q.
- CMV NASBA qualitative assay upgraded to Real-time quantitative assay.
- New Assay for HSV 1 & 2 detection by RT NASBA standardized.
- New Assay for EBV detection by RT - PCR (Light Cycler, Roche) standardized.

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